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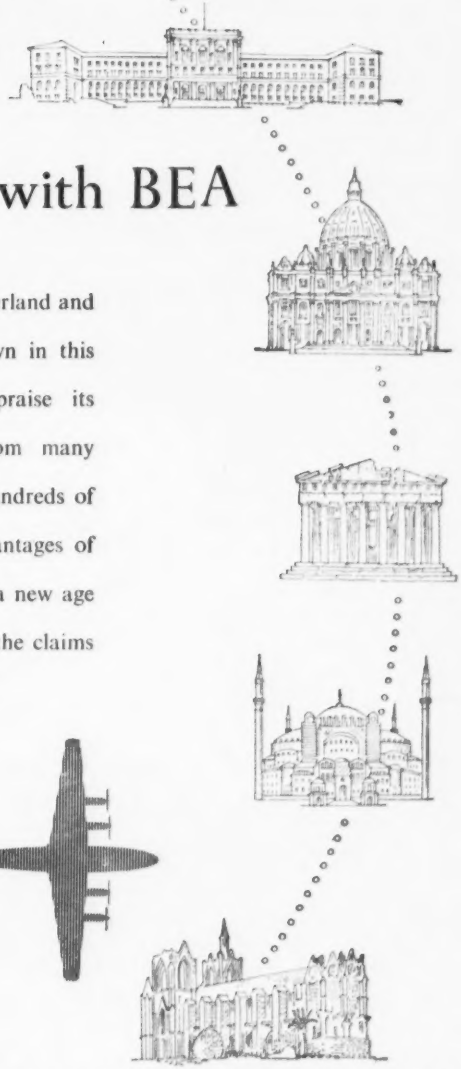

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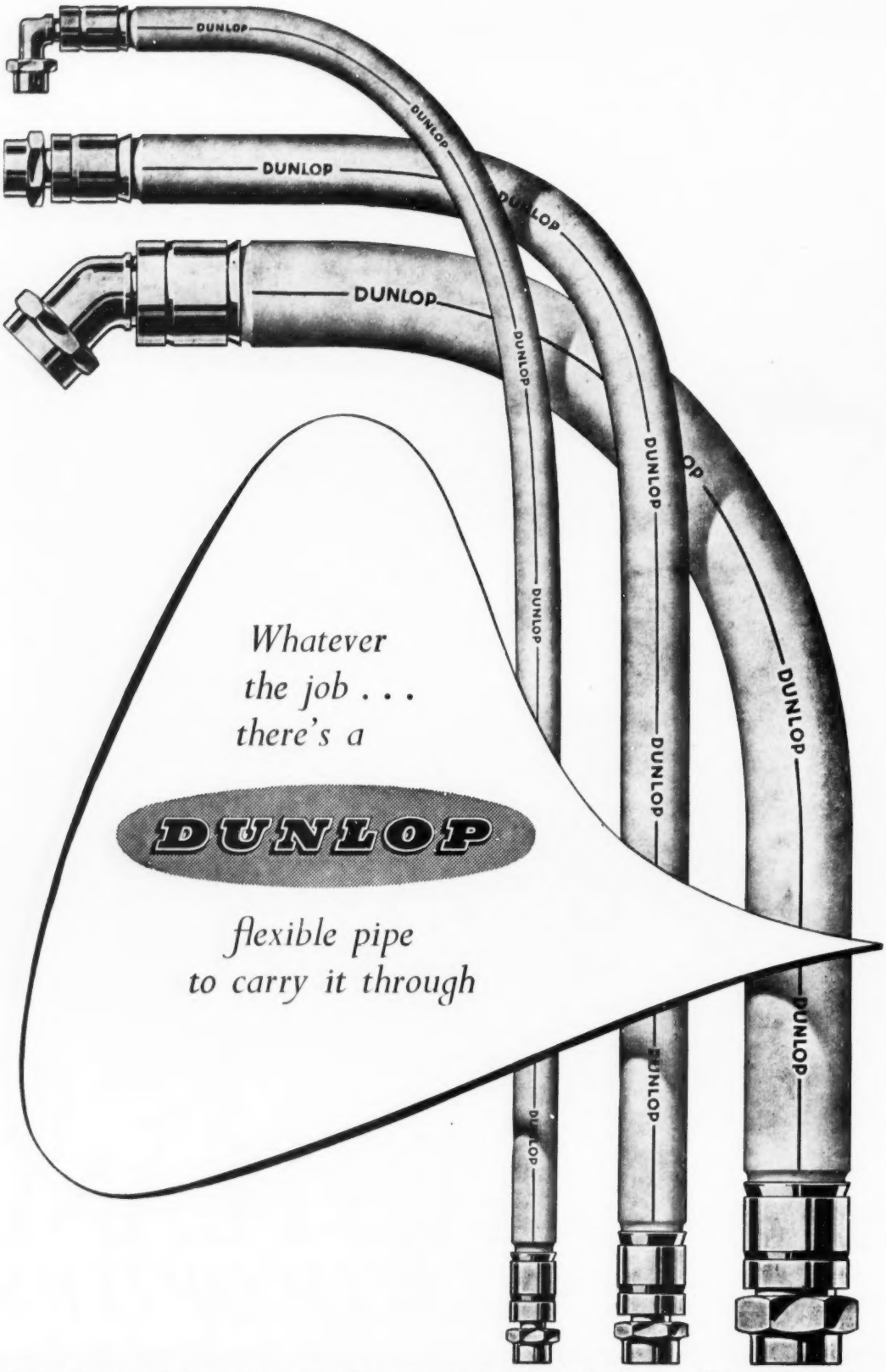

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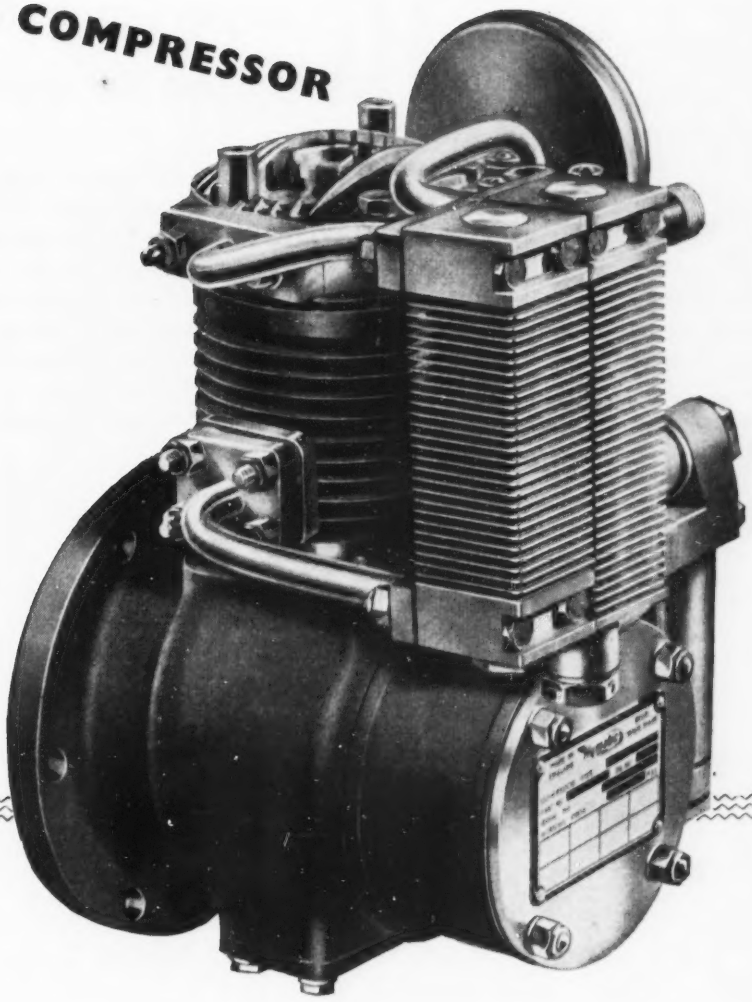

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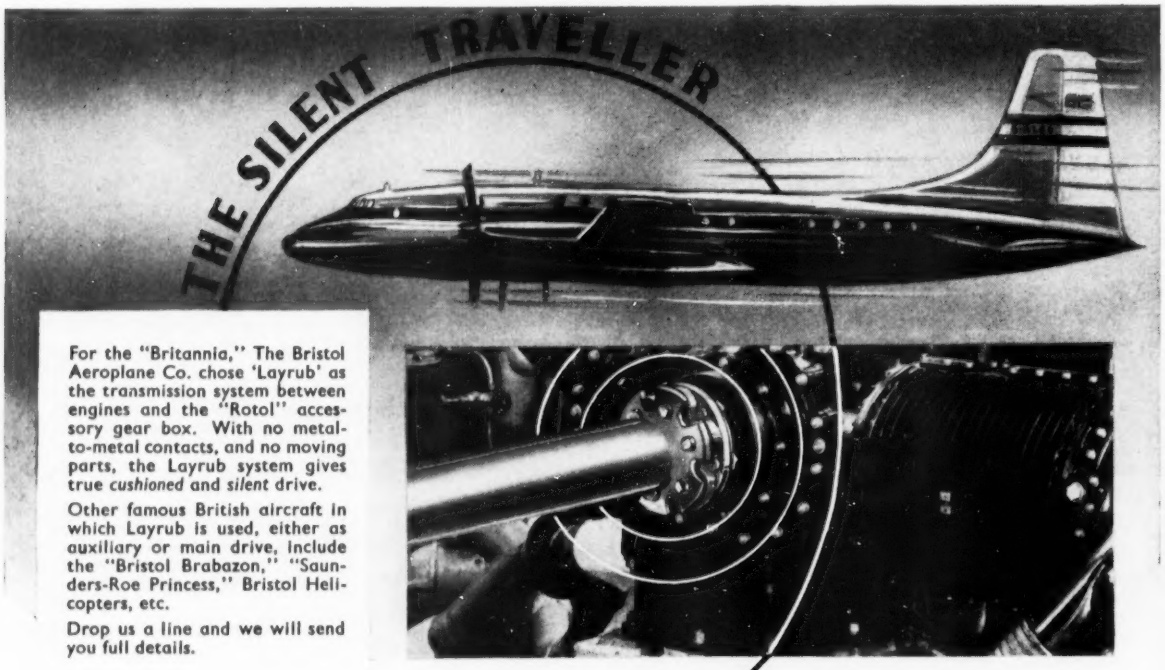

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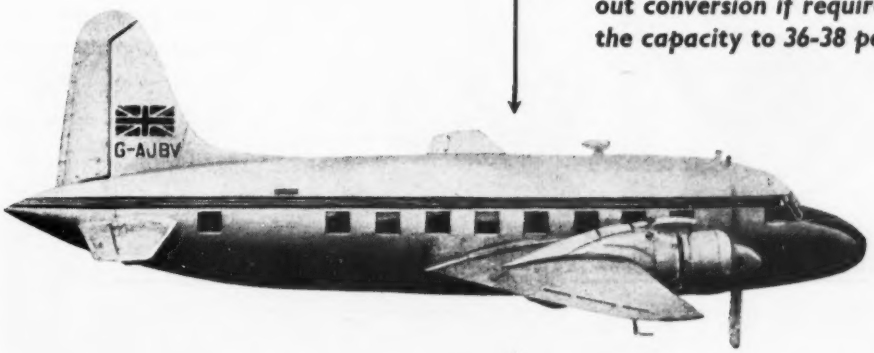

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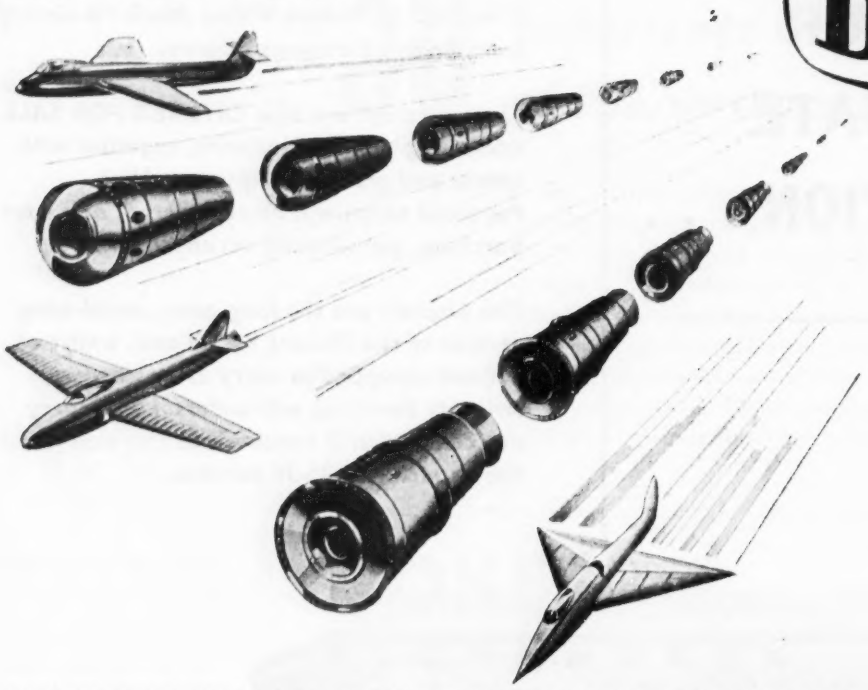

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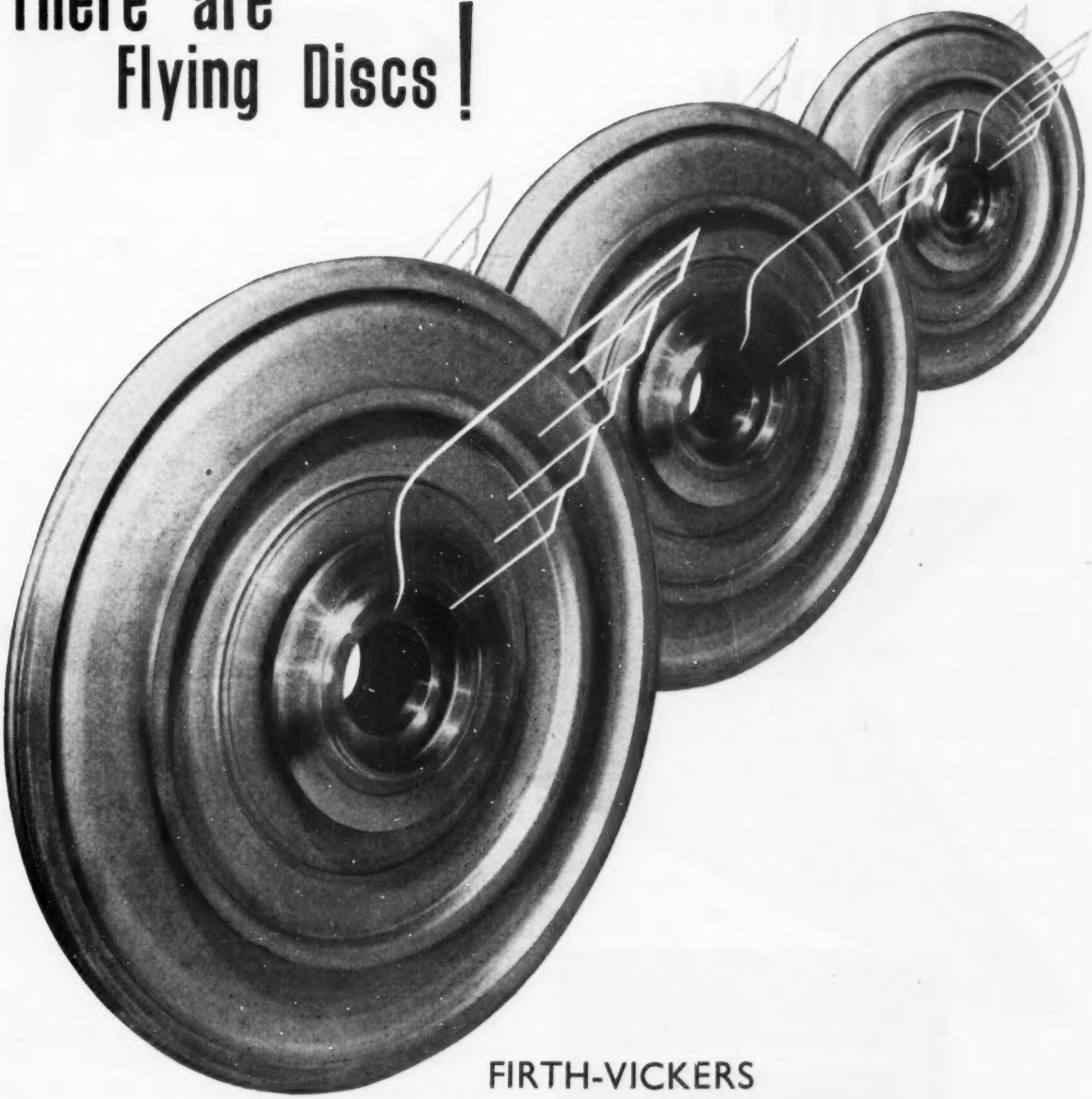

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No More Scruples

ONE cannot help feeling sorry for the foreigner learning to spell and read the English language: plough, cough and dough must be as difficult for him to accept as *la plume de ma tante* is simple for us. By the same token, our curious systems of mensuration, though picturesque and packed with tradition, are nevertheless a misery to all who must learn and use them. In the schools, the drudgery associated with the third "R" in basic education would be much reduced were tables of weights, measures and money to mount in regular tens and hundreds—as they do for the children in many other countries which use the metric system.

We learn with interest that the great profession and industry of pharmacy, having abandoned the scruple some time ago, is in July to abolish drachms and the like in favour of simple metric measures, the c.c. and its weight of water—the gram. Undoubtedly this will make the work of many people appreciably easier and, what is perhaps more important, will bring this country into line with many others which already employ these metric units.

But then there are snags and shortcomings to outright acceptance of metrics—as Major Oliver Stewart, chief journalistic metrician in this country, would freely admit. Centimetres, metres, and kilometres are all very well, but when it comes to aeronautical or any other kinds of navigation, nautical miles have almost everything in their favour. It follows that knots are preferable to miles (or kilometres) per hour. Sound has not seen fit to travel at any particular round-figure speed at sea-level, and thus the practical and useful decimal Mach number has been adopted and is to an increasing extent replacing older units of speed for air pilots.

Most people know that the nautical mile (of 6,080ft) was selected as being the length of one minute of latitude or one minute around the equator's arc—in fact, we believe, it was subsequently discovered that this figure was a little over seven feet short. Up or down the globe, one is surprised to find that metric units fit better, the distance from pole to equator being 10,000 km.

On the whole, circular measurements and the related ones of map-distances and time do not lend themselves to decimal points. May we be preserved at this time from 100-degree right-angles and ten-hour clocks!

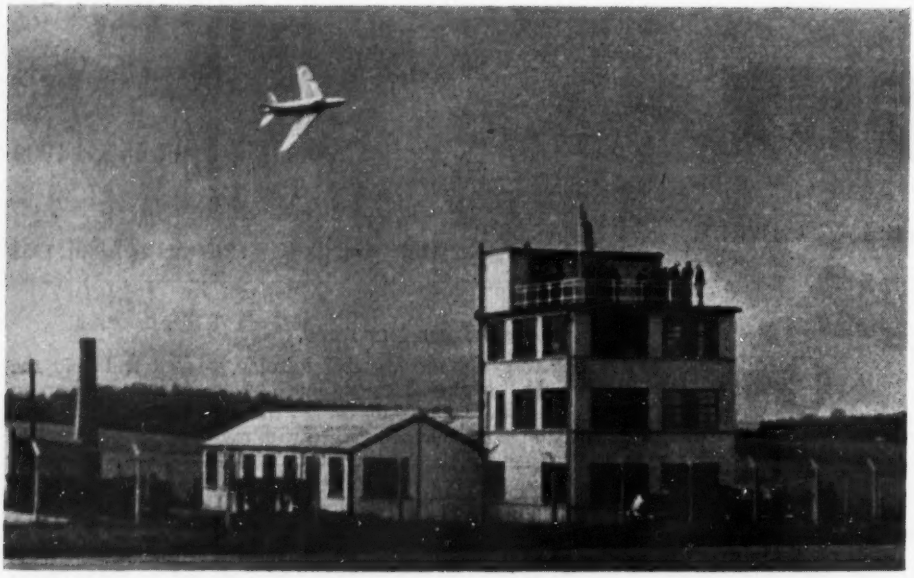
Standardization of screw threads is a different but associated matter, and one which equally calls for attention. If, innocently, one asks the engineer why this country has remained faithful to its B.S.F.s and Whitworths for so long, the rather uninformative answer may be—as to us on one occasion—that they are "better" threads than the others. Whitworth threads are quite widely used in America and elsewhere for some classes of work.

In fact, the very important, if unspectacular, decision of about four years ago that Great Britain, Canada and the United States would adopt a new, diplomatically named Unified Standard Thread is now being implemented in this country; and when, in the near future, the B.S.I. specifications are issued, U.S.T. threads are likely to be officially specified for new engine and aircraft contracts. Already at least one aircraft manufacturer is in process of adopting this 60-deg thread. We may add that America and France have, in the main, always used 60-deg threads, while B.S.F. and Whitworth employ the 55-deg angle. Apparently Great Britain yielded most in the interests of standardization, and agreed to stand the cost in time and money.

It is an example of the fact that habits die hard, that British factories happily employ a great mixture of national and metric measures in their day-to-day work and are slow, if not actually reluctant, to change or unify them in any way.

To summarize, if the chemists and also the many technicians concerned with screw threads, are examples of groups separately prepared to go to considerable inconvenience and expense for a short period to achieve greater efficiency and standardization later, then there is hope that others may be prepared to follow suit.

Regardless of the impression which might be given by some of the remarks in these in part light-hearted notes, we believe that much good would come both of more unification and of the use of the simplest available units; in several instances, and particularly where arbitrary measures are concerned, this implies the adoption of the metric system.



"FLIGHT" Photographs

Mr. Morgan passes the Chilbolton control tower. His speed approximated to that at which he broke the London-Brussels record—665.9 m.p.h.

SUPERMARINE'S ROYAL DAY

The Duke of Edinburgh Visits Chilbolton and South Marston in the Viscount

A BEAMING George Edwards emerged from the cockpit of the Viscount 700 over Exeter last Friday evening to inform us, "You are now being driven by the Duke." For him the moment must have been as proud as that when he himself first took control of the Valiant, having as he said, watched it grow from a blank piece of paper. For the writer the flight was an unexpected privilege—the culmination of a significant day for British aviation in general and for the Supermarine Division of Vickers-Armstrongs in particular.

That morning the Duke of Edinburgh had landed in the Viscount at Chilbolton, accompanied by the Duke of Kent, Maj. Gen. C. A. L. Dunphie (managing director of Vickers-Armstrongs aircraft division), Mr. T. Gammon (director), and A. Cdre. Sir E. H. Fielden, Captain of the Queen's Flight. The captain of the aircraft was Stuart Sloan and George Lowdell was his No. 2.

The Royal party was received by Supermarine's chief designer, Mr. J. Smith, and when the Duke had been introduced to Jeffrey Quill (chief liaison officer) and to test pilots Lithgow ("Mike"), Morgan ("Dave"), Colquhoun ("Les"), Horne ("Chunky"), and Judge ("Pee Wee") he entered the flight-test hangar, the contents whereof would have sent a spotter into transports of ecstacy.

The Duke's attention was first directed to Type 508 VX136, standing with its twin, VX133, to the left of the hangar entrance. The points of this twin-Avon straight-wing Naval fighter having been explained by Messrs. Smith, Lithgow and Rigg, he crossed the hangar to Swift WK194. In common with other Swifts in the hangar (and there were several) this had prominent wing fences, and we noted two large gun ports and a small port for a camera-gun in the long, brown-tipped nose. His Royal Highness sat in the cockpit and operated the massive, quick-acting flaps, which are a feature of the Swift. Moving on towards the western end of the hangar he further examined Swifts VV119 and WK198, talked with operatives, and before leaving the hangar walked across to the dainty Spitfire Trainer G-AIDN.

Thence the party moved over to the office block, where flight-test equipment and test results were explained by Mr. Dickinson and members of the Technical Office, and His Royal Highness then ascended to the roof of Flying Control to witness a brief flying display by Mr. Morgan.

The Swift concerned was to have been WK195 (the first with reheat) in which Morgan had earlier in the morning banged supersonically in the direction of Boscombe Down; but a cracked jet pipe caused him to transfer to WJ960 in which he established his London-Brussels record last year. He brought this prototype past the control tower at a speed approaching 700 m.p.h. and showed its slow-speed capabilities also; but low cloud ruled out any fancy aerobatics.

From Chilbolton the Duke drove to Hursley Park, which he entered by way of the Experimental hangar, and where he inspected the drawing office, discussed projects and lunched in the manage-

The Duke of Edinburgh studies an Attacker fuselage with Mr. S. Woodley, Superintendent of the Supermarine works of Vickers-Armstrongs, Ltd. (Right) Mr. "Joe" Smith, chief designer, Vickers-Supermarine, explains points of the Attacker to the Duke of Kent.

The prototype Swift on which Dave Morgan gave his flying display at Chilbolton. Note the recently installed wing fences.

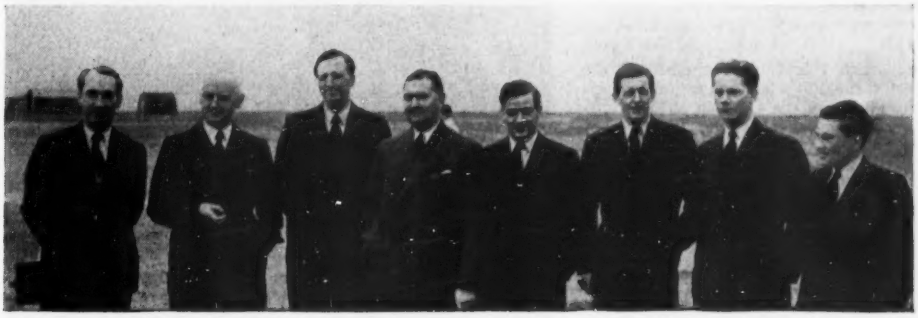
ment mess. Having motored back to Chilbolton he boarded the waiting Viscount and left for Supermarine's South Marston works, a few minutes' flying time away.

On arriving there in teeming rain he was conducted by the Superintendent, Mr. S. Woodley, to the press shop, where he inspected a Hufford stretcher, Farnham rolls, a Fielding and Platt stretcher, and heat-treatment; then he proceeded to No. 2 shop and the tool room. In the machine shop His Royal Highness saw the capstan line, Hydrotels, a spar miller, and watched thread-rolling and grinding. His route then lay, by way of the fitting shop, hoods, tanks and polishing shop and coppersmith's shop, to No. 3 shop, where he saw the last of the Attackers for the Royal Navy and the first Swifts for the R.A.F. A rotating fuselage-jig and an Attacker-wing functioning-jig were objects of particular interest and the Duke had a special word for the women working on wiring looms. Before leaving the works he was conducted through the training school, the instrument test-house and wireless section, the paint shop and flight shed and took tea in the Superintendent's office.

It was at this time that a vicious double crack emanated (so Jeffrey Quill assured us) from the reheat Swift, fitted by them with a "plain" tailpipe. Mr. Morgan thereupon proceeded to bring it down to a negligible height for a characteristic roaring, crackling performance. By comparison, the Viscount's Darts, as we heard them from the cabin, gave out a muted murmur.

Airborne, the Viscount swung westward, climbing to 20,000ft over Exeter, where the Duke took control, watched by the Duke of Kent. He made some well-judged turns before setting course for Hurn, where the Viscount began her let-down for London Airport. Mr. Sloan took over for a G.C.A. landing.

It was the Duke himself who, before leaving the airport saw that a memento of the day—a model Swift—was retrieved from the Viscount and stowed in the Royal car.



At Chilbolton, before being introduced to the Duke of Edinburgh and the Duke of Kent, are (left to right): Messrs. Quill, Smith, Lithgow, Woodley, Colquhoun, Morgan, Horne and Judge.

MORE ABOUT GUIDED WEAPONS

WHEN, on April 16th, the House of Lords continued the Defence Debate (reported on page 520), Lord De L'Isle and Dudley, the Air Minister, added a postscript to Earl Alexander's announcement of the use of ground-to-air guided weapons by the R.A.F. Their introduction, he said, would be "much slower than the public mind is likely to be accustomed to."

It was, he emphasized, a long-term project. The R.A.F. deeply appreciated its new responsibility, but perhaps the most difficult problem was the shortage of highly skilled technicians, which all the Services were experiencing.

Of Earl Alexander's remarks on the radar defence system, the Air Minister spoke of the magnitude of the task of its "re-birth." This, he said, came under three main headings: The provision of specialized buildings and living quarters; an immense network of communications carried out by the Post Office; and the manufacture of new and more efficient radar equipment. The electronics industry and Government research departments were making good progress in these respects.

Turning to aircraft production, Lord De L'Isle and Dudley said that the Swift, Hunter and Javelin had taken longer than was expected. "Those who cut the corners may get numbers, but at a price we are not prepared to pay. This great new family of fighters have development built into them, which means that later marks can be improved to give a superior performance without having to have a completely new design."

Of Lord Trenchard's question as to whether the new bombers, the Valiant, Vulcan and Victor, had enough range to deliver the atom bomb anywhere, the Air Minister said: "I can assure him that they have the capabilities he wants. The atom bomb is the critical military factor in the world today.

"It would not be right for us to forgo this supreme expression of military power as we value the weight and strength of the United States Air Force. It would be wrong to leave the counter-offensive to them."

The Valiant was "coming along well," but he could not prophesy when it would come into service. Its makers had recently been told that they would receive the necessary follow-on orders to maintain their full rate of production.

Many of the subsequent speakers on the second day of the debate supported Lord Trenchard's advocacy of the long-range atomic bomber as the backbone of British air power, while others revived recent arguments as to the value of the aircraft carrier under modern conditions.

A BRISTOL LECTURE

THE development of the Proteus turboprop was the subject of a lecture by Dr. S. G. Hooker, O.B.E., A.R.C.Sc., B.Sc., D.I.C., D.Phil., F.R.Ae.S., F.R.S.A. (chief engineer, engine division, Bristol Aeroplane Co.) at the Royal Fort, Bristol, on April 16th. The occasion was a joint meeting of the Bristol, Gloucester and Cheltenham and Yeovil branches of the Royal Aeronautical Society, the first "area meeting" of the Society to be held in the south-west.

Chairman for the evening was Dr. A. E. Russell, president of the Bristol branch, and also present were Mr. A. E. Bingham, chairman of the Gloucester and Cheltenham branch, and Mr. D. L. Hollis Williams, vice-president of the Yeovil branch. Among the representatives of the main Society were Mr. G. H. Dowty, the president, and Dr. A. M. Ballantyne, secretary.

Dr. Hooker began by considering the main thermal cycle and comparing the efficiencies of turboprop and turbojet aircraft. From a study of basic principles, the propulsive efficiency of a turboprop was inevitably much greater than that of a turbojet, he stated, although the latter's thermal efficiency increased with altitude and speed. The lecturer then described briefly the Proteus engine, and went on to enumerate at length the problems which had arisen during its development, and to tell how these had been overcome. The design of the Proteus 705 (the Mk 3) was detailed, and forecasts given of even greater improvements in performance in the future, with the Proteus 750.

FROM ALL QUARTERS

Offshore Hunters: Order Signed

YESTERDAY a contract was due to be signed in Paris between the Ministry of Supply and the United States Mutual Security Agency for a large number of Hawker Hunter fighters for the NATO countries. The value of the contract has been variously quoted as between $70m and $100 m (£24½ m to £35½ m), and the number of aircraft involved as between 200 and 400, with spares. No official clarification was obtainable up to last Tuesday.

The delay which has occurred in the signing of the order has been largely due to the old stumbling-block of the June 1955 deadline, and it is still not clear whether this is being extended by a year by Congressional action or whether the difficulty will be surmounted by some such move as a loan arrangement for the completed aircraft.

Once this contract has been signed, the way may be open for the signing of further orders—for Hunter production in Holland and for Avon production in Belgium, as already mooted. With the Mystère IV already being produced in France, a remaining possibility would then be that of Javelin airframe-component production in Italy. Results of evaluation tests by Gen. Boyd's team are learned to have been satisfactory.

Germans Fly British

EXECUTIVES of Gesellschaft Für Luftverkehrsbedarf, the company which has been formed to select and acquire equipment in preparation for the revival of the German airline Lufthansa, sampled both the Comet and the Viscount on Monday. The party, which included Dr. Ing. Knipfar (representing Dr. Seebohm, Federal Transport Minister), flew from Cologne to Hatfield in a B.O.A.C. Comet on charter to de Havillands; the aircraft flew *via* Geneva, covering the 850-mile journey in 2 hr 5 min. After touring the de Havilland factory and Comet production lines at Hatfield, the German visitors returned to Cologne in a Viscount.

In Bonn on Monday, Herr Bongers (chairman of G.F.L.) was reported as saying that his company intended to buy Comet 3s for the projected Atlantic services. It seems likely that American equipment may be adopted initially, for reasons of availability and range.

The Air-Corridor Discussions

UP to last week-end, few details had been released on the progress of the four-Power conference on the Berlin air corridors, but it is believed that the Soviet proposals (put forward at the meeting at Karlhorst on April 7th) had led to some hard bargaining. These proposals were reported to provide for the substitution of one widened corridor for the three now in use, and for the total exclusion of military aircraft from the corridor.

It is believed that this last condition, together with a request for 90 minutes' notice of all intended flights, were the chief points against which the West Powers' representatives raised counter-arguments. A five-hour meeting was held last Friday and another was due to take place last Wednesday.

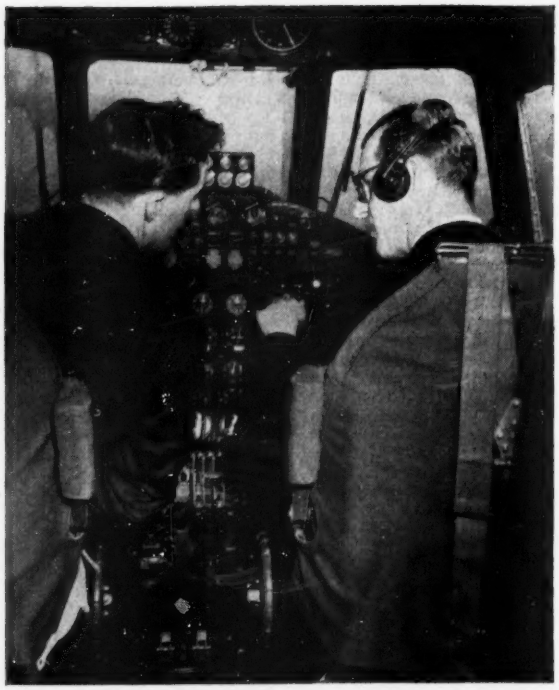
Four More Handley Page Appointments

LAST week we recorded three executive appointments made within the Handley Page organization, and now comes news of four more. The first is that of Mr. R. S. Stafford, F.R.Ae.S., chief designer since 1945, who has been appointed director of the technical department. Mr. Stafford, who joined the firm as a draughtsman 27 years ago, became chief aerodynamicist in 1934 and assistant chief designer at the beginning of the war. He has been responsible for the design work of the Hastings, the Hermes and the Victor.

Dr. G. V. Lachmann, D.Ing., F.R.Ae.S., becomes director of scientific research. He has been associated with the company since 1921, first in the initiation and development of the slotted wing and later in charge of aerodynamics and stressing. He was chief designer from 1932 to 1936 and did special research work up to 1939. During the war years and afterwards he was a consultant to the company and since then he has been in charge of special problems in research, design and development.

Mr. C. F. Joy, A.F.R.Ae.S., has been appointed chief designer. He joined Handley Page, Ltd., in 1944 as deputy chief draughtsman, becoming assistant chief designer in 1947 and deputy chief designer last year.

Mr. G. H. Lee, A.R.C.S., B.Sc., D.I.C., F.R.Ae.S., who has been with the company for 16 years, succeeds Mr. Joy as deputy chief designer. He was appointed research engineer in 1940, chief aerodynamicist in 1949 and assistant chief designer (aerodynamics) last year.



FIRST GENTLEMAN—SECOND PILOT : As related on pages 502-3, by one privileged to be a passenger, His Royal Highness the Duke of Edinburgh flew the Vickers Viscount over western and southern England last Friday. This picture was taken at 20,000, between Exeter and Hurn. Captain of the aircraft (left) was Stuart Sloan.

The Need for Technologists

AMONG some parents of boys of school-leaving age the idea still survives that a career in industry is not so "respectable" as one in the Services or professions. That such a point of view is not only out of date, but harmful, was the theme of a speech made by Lord Hives (chairman of Rolls-Royce, Ltd.) when he opened the extensions to Nottingham University's engineering laboratories on April 14th. Industry today, he said, provided the life-blood of the nation; without it, we should be finished as a great power.

In the year 1950-51, 72.5 per cent of Britain's university students were in some measure or other assisted financially by the State; yet of the full-time undergraduate population only 12.4 per cent were studying technology. Saying the Government were tackling the problem at the highest level, Lord Hives instanced the decision to expand the Imperial College of Science and Technology, and the plans to make resources available in other

H. P. PERSONALITIES referred to in the news-item on this page. Left to right : Mr. R. S. Stafford, Dr. G. V. Lachmann, Mr. C. F. Joy and Mr. G. H. Lee. Mr. Stafford becomes director of the technical department and Mr. Joy succeeds him as chief designer.

parts of the country. But he doubted whether measures such as these would alone effect a cure; the roots of the matter went much deeper. With a few exceptions, engineering was not taught in the schools, so that a boy considering his future knew nothing at first-hand of one of this country's greatest careers; and careers masters at schools were regrettably ill-informed as to the opportunities which existed. Adding that even when the masters were aware of the prospects, they found it difficult to convince parents, Lord Hives then referred to the old-fashioned attitude mentioned above.

He went on to speak of the contrasting American attitude, quoting the report of one of the Anglo-American productivity teams—"because of this social and intellectual prestige attaching to the highest positions in industry, many of the best students choose it as a career." Many such positions, he said, were nowadays being increasingly held by trained technicians, and not by businessmen as such.

Among other points made by Lord Hives was the danger of university engineering laboratories becoming "museums," owing to their reluctance to scrap obsolete equipment. Rolls-Royce, he said, made a point of passing on their equipment to the universities; it was gratefully accepted, because in nearly all cases it was much more modern and useful than their existing apparatus.

A.S.M.'s New General Manager

Mr. W. F. Saxton

PROMOTION to the post of general manager of Armstrong Siddeley Motors, Ltd., comes to Mr. William Frederick Saxton, M.B.E., who has been the company's works and technical director since 1950. "Bill," as he is known throughout the industry, has been with Armstrong Siddeley ever since he left school in 1924 to join their aero engine design-staff. During the war, he was quality manager of the dispersal factories; in 1945 he became chief engineer, and in 1948 he was made a director.

Mr. Saxton, whose home is in Coventry, is president of the Armstrong Siddeley's apprentice association, and for many years he was a member of Coventry City Rugby football team. Now 45 years of age, he is married and has four children.

Avon Achievement

ONE of the last actions of Air Chief Marshal Sir Hugh P. Lloyd, who recently retired from the post of C.-in-C. Bomber Command, was to direct a remarkable programme of intensive flying by the R.A.F. The subject-aircraft were three Canberras, and the object of the trials was to determine the ultimate overhaul life of their Rolls-Royce Avon turbojets, modified to the latest standard. The tests also provided a yardstick for R.A.F. maintenance and overhaul requirements.

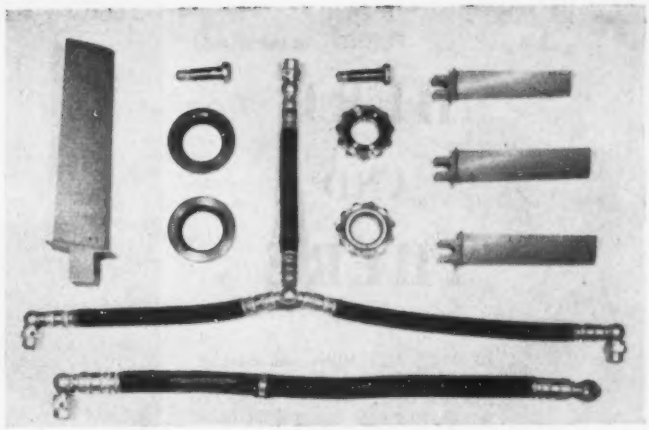
Top priority was accorded the operation at R.A.F. Stations Binbrook, Upwood and Hemswell. Six Avons were concerned; two were examined at 400 hr and one at 450 hr, and as their strip condition proved satisfactory the decision was taken to continue flying the remaining three to an overhaul life of 600 hr.

The first R.A.F. station to fly the Avon for 600 hr was Binbrook; Upwood maintained a similar intensity of flying but was not called upon to complete the 600 hr as their Avons were the subjects of the 400 hr inspection. The remaining two Avons are being flown at Hemswell, where other duties have rendered it impossible to obtain the same intensity of flying.

At Binbrook the flying and ground organization was the responsibility of F/L. J. O. Thomas, who himself contributed about 140 hours of flying. The 600 hr was completed in 50 days, in which time some 300,000 miles were flown. Turn-round time improved tremendously as the trial progressed; the average for the first month was 1 hr 35 min, for the second month 1 hr 10 min, and for the third month 36 min. On one occasion Canberra WH652 landed, was serviced and took off again in 30 min. It was often necessary to salt and sand the snow-covered runways, and some doubt was expressed as to the corrosive effect on the airframe and power plant. On examination of the first Avon at 450 hr there was no sign of corrosion by salt.

Initially a Lincoln was used to ferry Canberra ground crew and aircrew to various diversion airfields. This, however, proved inefficient, and it was eventually decided to operate from Leuchars, where a complete ground crew was based, and four or five aircrews operated round the clock, flying as many as 22 hr in 24. Peak utilization was reached at 73 hr flown in an 84-hr period.

Maintenance was stated to be "negligible," and at the end of the 600-hr period performance was still acceptable to the Rolls-Royce Production Schedule: the thrust output was still within 3 per cent of the standard figure, and the increase in specific fuel consumption was 0.11 per cent. Rejected parts —none of which actually failed—are shown in the photograph. Flame-tubes were only slightly affected and all were accepted for a further service life of 400 hr.



REJECTION, BUT NO DEJECTION: Parts of the "600 hr" Avon (see accompanying news item) which were rejected after the engine had been stripped and examined. They are: four compressor-rotor blades; two auxiliary-drive roller bearings; two auxiliary-drive oil seals; two flexible fuel pipes; and two compressor-shaft taper bolts.

Rolls-Royce, to whom—as to the R.A.F. and English Electric —the warmest congratulations are due, point out how favourably the turbojet now compares with other forms of transport on a basis of miles between overhauls. Six hundred hours represents a distance of 300,000 miles, comparing with the 100,000 miles by a typical railway locomotive or commercial road vehicle.

The P.O.W. Exchange

AIR transport is playing an important part in the repatriation of prisoners and internees from Korea. The more seriously ill P.O.W.s, as they are handed over at Panmunjom, are being flown a few miles back to Munsan, where the reception camp, "Freedom Village," has been established. After being sent on to Seoul—again, in some cases, by helicopter—Commonwealth ex-prisoners are being evacuated by R.A.A.F. aircraft to Kure, the British base in Japan. From there the Britons will be flown through to England. It is reported that arrangements are being made to transport T.B. patients in American pressurized aircraft.

The ex-internees—six Britons and an Irish missionary—who were being taken by the Russians to Moscow, where they were due to be handed over to the British Ambassador last Monday, were to leave the Soviet capital on Tuesday in an R.A.F. Hastings sent out from Lyneham to collect them. Special permission for its landing at Moscow was given by the Russians. The aircraft was fitted with stretchers, and on board were a doctor and a nurse.

R.A.E. Appointment

RECENTLY appointed a deputy director at the Royal Aircraft Establishment, Farnborough, is Dr. F. E. Jones, M.B.E., who has had a distinguished career in Government service, particularly in the field of electronics. Dr. Jones, who is now 39 years of age, was educated at Royal Liberty School, Romford, and King's College, London. A student of Sir Edward Appleton, he graduated in physics in 1936, and was awarded a Ph.D. degree in 1939 for work on microwave measurements of liquid dielectrics. In 1940 he went to the Air Ministry Research Establishment (later to become the Telecommunications Research Establishment), where he was concerned with the development of such famous bombing aids as "Oboe"; in 1941 he was appointed leader of the Blind Bombing Group, and for his work on "Oboe" he was made M.B.E. in 1946. In 1945, says *R.A.E. News*, he formed a basic research division at T.R.E. to study the millimetre-wave and infra-red fields, this sphere of investigation later being expanded to cover solid-state and low-temperature physics.

Dr. F. E. Jones.

HERE AND THERE

OF MICE AND MEN—and monkeys: The aircraft nearer the camera is a Lockheed DT-33, acting as mother ship to a QF-80 drone. It guided the latter, which carried 60 mice and two monkeys, through the atomic cloud resulting from a test explosion at an altitude of 5,000ft over Yucca Flats on April 6th.

Royal Visit to Hawkers

ON May 19th the Duke of Edinburgh is to visit the Hawker factories at Kingston-on-Thames. Afterwards he will see a demonstration by S/L. Neville Duke at the company's airfield at Dunsfold.

Brazilian Meteors Arrive

THE first two of the 70 Meteors acquired by the Brazilian Government in exchange for 15,000 tons of cotton arrived in Rio on board the *S.S. Highland Princess* on April 13th. The first group of air- and ground-crews trained in Britain have already returned to Brazil.

Sommerfield Tracking Claim

ALTHOUGH the Royal Commission on Awards to Inventors finished their hearing on the Sommerfield tracking claim on March 27th, they have deferred their decision until July 27th. The postponement arises from the fact that a Mr. J. Sacks has put in a claim to have invented the linking bars used with the tracking—Mr. Kurt Sommerfield's well-known war-time "tin lino" for airfield-surfacing.

Exonerated

THE rescue-work by aircraft in the recent floods was quoted by Mr. R. H. Bound (technical director of Dowty Equipment, Ltd.) in a "brains trust" debate organized by the Gloucester and Cheltenham Branch of the R.Ae.S., the question under discussion being: "Has the modern development of aircraft been a benefit to mankind?" In spite of counter-arguments from the Bishop of Gloucester and other speakers, the chairman (Mr. Eric Greenwood, Gloster technical sales manager) decided that the feeling of the audience was in favour of aviation. Mr. H. G. Conway (British Messier technical director) was among the speakers "for."

A COMET YEAR

THE successful completion by B.O.A.C. of its first full year of pure-jet flying is to be marked next week (May 1st) by the publication of an enlarged number of *Flight* containing specially written and illustrated articles on Comet operations.

"Lovely stuff—give you twice the life what you're using now, old man."

The B.I.F.

THE Coronation British Industries Fair opens at Castle Bromwich, Birmingham and Olympia and Earls Court, London, today, April 24th. It will remain open (Sunday excepted) until May 8th. Many firms associated with the aircraft industry are exhibiting, particularly in the engineering section at Birmingham.

Interception

AN Australian sheep farmer, alarmed at the depredations of wedge-tailed eagles on his flocks, engaged a local marksman and sent him aloft with a shotgun in a light aircraft. Two eagles were spotted, and one shot down, at the first attempt.

Functional Beauty

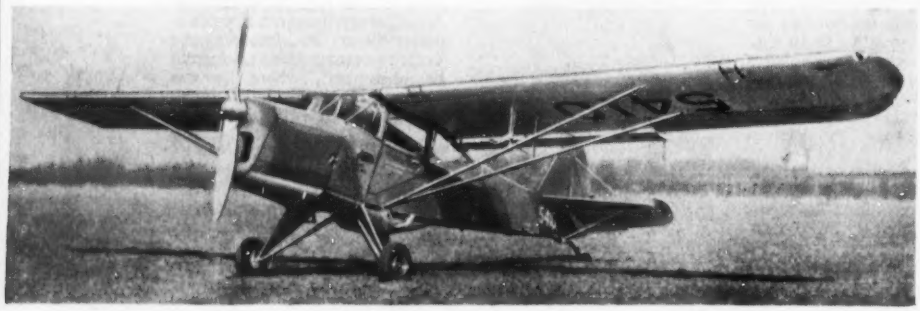
"BOTH the W.1 engine and the E.28 airplane now have honoured places in the Science Museum at South Kensington, but the airplane at least does not look like a museum-piece. In my opinion, it is still one of the best-looking aircraft ever made, and George Carter and his team have every reason to be proud of it"—Sir Frank Whittle, in his current series of autobiographical articles in *The Sunday Express*.

Help for "Axed" Instructors

THE Guild of Air Pilots and Air Navigators of the British Empire is extending its offer of assistance to flying and navigational instructors thrown out of employment by the closing of additional civil schools. A committee has now been set up to co-ordinate the work of the Guild, and of B.A.L.P.A., with that of the Ministry of Civil Aviation, Air Ministry and the Ministry of Labour. Inquiries should be made to the Guild at 19, Park Lane, London, W.1.

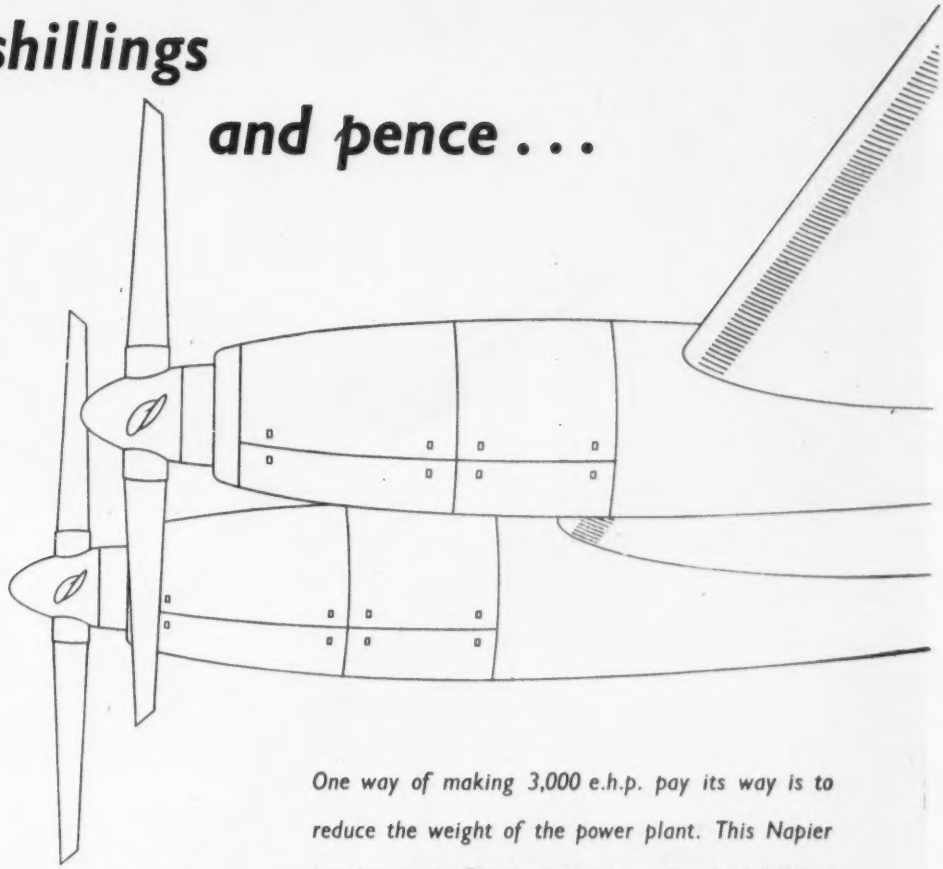
Lectures on Navigation

IN connection with the "Navigation Today" exhibition, which opened at the Science Museum, South Kensington, yesterday and continues until September 20th, six special lectures are being given, designed to appeal to audiences of 15-18 years. Subjects include *Navigation on Historic Flights*, by W/C. J. L. Mitchell, M.V.O. (April 30th), *Polar Air Navigation*, by W/C. E. W. Anderson, O.B.E., D.F.C., A.F.C. (June 11th), and *Interplanetary Navigation*, by A. C. Clarke (September 10th). Each lecture takes place at 6 p.m., and admission is by ticket obtainable on application to The Director, Science Museum, London, S.W.7.



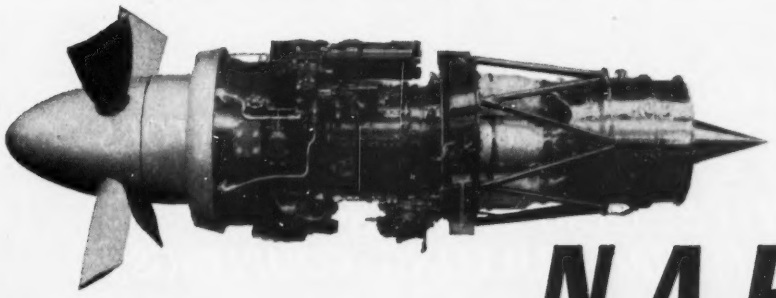
FOR THE UNION: Differing from the Mk.6 A.O.P. in having a long-range tank and Fairey metal airscrew, this Gipsy Major Auster (one of five for the S.A.A.F.) is finished in light blue beneath and dark green and earth above. There are vertical and oblique camera positions.

Lbs. shillings and pence . . .



One way of making 3,000 e.h.p. pay its way is to reduce the weight of the power plant. This Napier has done in the Eland, to the point where in a 4-Eland installation overall weight saving may amount to as much as 3,500 lb. calculated on a lb.-per-installed-h.p. basis. What this represents in terms of payload, performance and direct operating cost will be apparent to the operator.

ELAND



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ELECTRONIC SURVEY

Special Equipment of a Percival Prince for Oil Prospecting

AS reported in our issue of April 10th, a specially equipped Percival Prince recently left Bovingdon for East Africa, where it is making a geophysical search for oil by the magnetometer technique. The aircraft, shown in the top photograph, carried a radio altimeter and 35 mm camera as well as the magnetometer, and all these items of equipment were designed and built by P.S.C. Applied Research, Ltd., a Canadian member of the Hunting Group. The aircraft can be seen to have a transparent nose for the navigator. The magnetometer itself is fitted in the tail, and the bottom photograph shows Mr. J. Stewart, one of the expedition's magnetometer-operator technicians, completing the installation (the unit can be replaced by fairings). When the equipment is in use, readings are transmitted to the large graph recorder on the console inside the aircraft. This is shown in the left-hand central photograph, which also shows the smaller graph recorder used to indicate the height of the aircraft above the ground, as measured by the radio altimeter. The magnetometer-altimeter story is then correlated with the actual terrain by means of continuous 35 mm pictures. The remaining photograph shows Mr. A. G. Palmer, the chief operator/technician, installing the camera. The expedition is being undertaken for the d'Arcy Exploration Co., Ltd., by Hunting Geophysics, Ltd.

MORE ABOUT "OPERATION BUDWORM"

IN our issue of February 27th we published a note on the measures planned for this summer against the budworm in New Brunswick, Canada, and mention was made of last year's successful trial venture, known as Operation Budworm. More details of this latter experiment are now available.

According to our American contemporary *Aviation Age*, construction of "Budworm Airstrip" began in November, 1951. Two 2,500ft runways, arranged in the form of a large V with an angle of 24 deg between them, were hacked out of the virgin forest by means of bulldozers. A parking space was also cleared, with room for fuel- and insecticide-storage and six aircraft-loading pits. Living accommodation was built a quarter of a mile distant. Twenty-one aircraft were used, all Stearmans except for one Beaver; four of them were Canadian-owned, the rest belonging to an American firm. The machines were fitted with underwing spray-booms, through which insecticide was passed by wind-driven centrifugal pumps. The Stearmans carried 125 gallons each and the Beaver 225. Dump valves were provided for quick release of the loads in case of engine failure or some other such emergency.

The operation was carried out last June. One of the runways was used for take-offs, the other for landings, and a continuous stream of aircraft could be seen becoming airborne, flying to their dropping zones within one to fifteen miles of the strip, landing back again in procession, filling up with fuel and insecticide at the pits with engines still running, and taking-off again for a further round trip. Forty-five seconds was apparently the average time between take-offs during busy periods.

The whole operation lasted a fortnight, including delays caused by weather. One aircraft was lost through engine failure, but the pilot was unhurt. About 160,000 gallons of insecticide were used, and a 99 per cent success in coverage was claimed after ground-test groups had made their reports.

The budworm is a pest that has been wreaking havoc in the forests of balsam fir and spruce, the timber of which is used in paper-manufacture and for many other commercial purposes.

Just as the Italians excel in the styling of car bodies, so do they produce most pleasing shapes in aircraft. Here the Ambrosini Sagittario soars high over snow-streaked mountains in Italy.

STRAIGHT to the TARGET

The Sagittario—Ambrosini's Latest Research Prototype

SOME details of their latest Ambrosini experimental jet aircraft were released recently by the Italian Air Ministry. Last week, in Rome, *Flight* was able to examine the machine in question—the Sagittario (Archer—or, perhaps, "from an Archer")—and hear something of its characteristics, equipment and purpose from Dott. Ing. Guido A. Ferrari, the company's chief experimental test pilot. Dr. Ferrari will be remembered by the sporting fraternity in this country for his fine performance as scratch man in the *Express* Race last year, when he flew an Ambrosini S.7 into second place at 230 m.p.h.

Ambrosini's more recent designs have included the S.7 standard basic trainer in the Italian Air Force which has a 225 h.p. Alfa engine (*Flight*, "In the Air" article No. 44, August 24th, 1951, refers); the Supersette, a similar but rather larger aircraft differing particularly in wing design and the power unit (Gipsy Queen 70); and now the related Sagittario. Incidentally, reverting to the Supersette, a second prototype with bubble canopy and inverted V.8 Alfa engine will probably be seen shortly.

The Sagittario has 45-degree swept wings and is powered with a Turboméca Marboré of 840 lb (380 kg) thrust. The prototype is intended in particular for aerodynamic research, and ultimately the design may be developed into a light intercepter. It is expected that two or three prototypes will be built, the third being of metal construction and able to take a turbojet of up to perhaps 4,000 lb thrust. Aerodynamically the machine is capable of a Mach number of about 1.05, but this first wooden prototype has structural limitations at a much lower figure, and its top speed in level flight is probably in the region of 350 m.p.h. Best climbing speed is about 200 m.p.h.

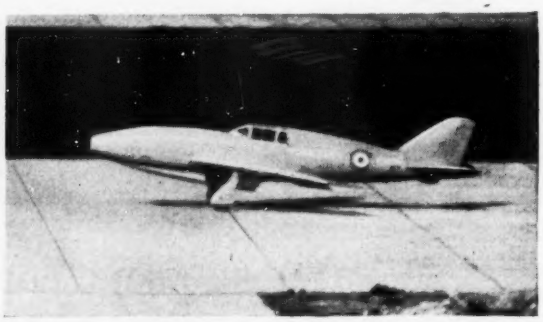
The basic fuselage of the Sagittario is that of the S.7, and to this have been added swept wings and tail surfaces. The resulting tail-down airframe was first flown with the aid of piston-engine power, this interim machine being known as the Freccia (Arrow).

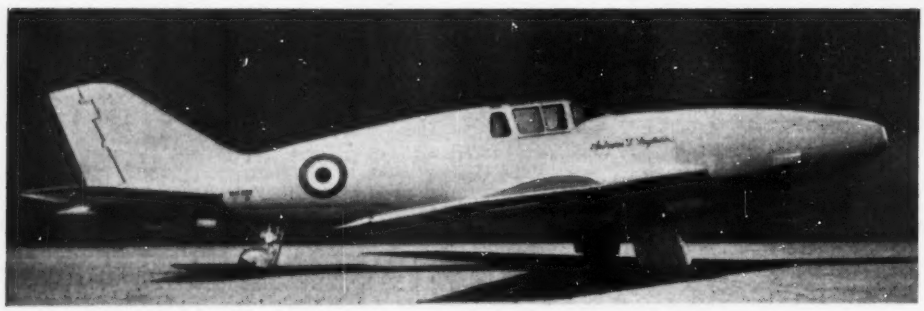
When the Marboré was installed the undercarriage became a problem, and so a separate retractable rear-wheel unit with a long leg was fitted mid-way down the fuselage tail. The main wheels are standard S.7 components folding forwards and inwards. The track is 8½ft (2.57 m). The composite jet machine has now completed some 30 successful flights and has provided a great deal of information about controls and the aerodynamics of the 45-degree wing-form which will be used for the similar prototypes to follow.

Undoubtedly the most interesting features are the wings and controls. The wing itself, of all-wood construction, is of varying thickness-ratio. Dott. Ing. Ferrari explained that, broadly speaking, the intention was to obtain crescent-wing characteristics from a straight-edged swept wing. The relatively thick tips give good stalling qualities.

For the first flights of the airframe with piston engine installed, fixed leading-edge slots, fences, dive brakes and aileron spoilers were fitted. The large-area ailerons also carried spring tabs. As soon as the handling characteristics had been sampled the slots were faired over and the dive brakes removed (of this more will be said later); the spring tabs were also abandoned, their effect at high speeds being unsatisfactory.

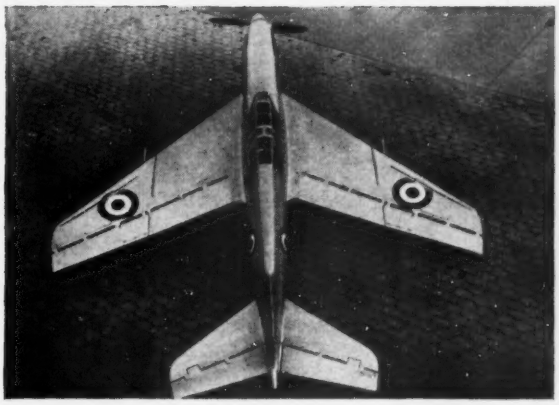
In the cockpit of the Sagittario there are several extra control wheels and levers, their purpose being to permit a pre-setting of the aileron angle up or down (a wheel on the port side); for the operation of the variable-incidence tailplane (another wheel on the port side); and for the individual or combined operation of the spoilers separately or linked with the ailerons and operated by movements of the stick (a pair of levers and a separate engagement lever on the port side control the spoilers). The flaps, which take

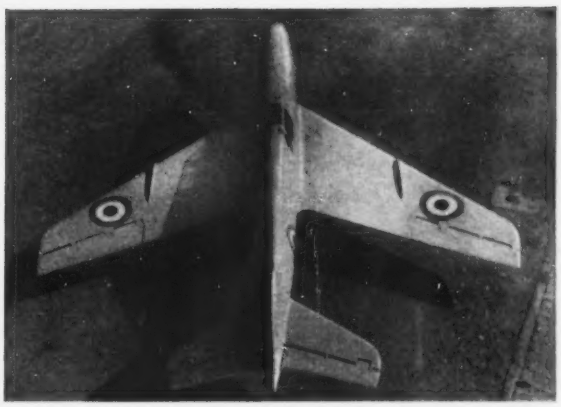




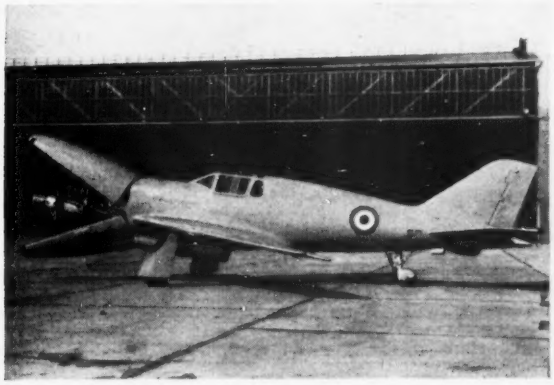
(Above) On this first prototype (the picture is of the first flight) the rear wheel is retracted when the tail lifts at take-off, but the main wheels are left down until later.

(Left) With some portions new and others familiar, the Sagittario, registered MM550, does not appear to be composite.





The piston-engined Freccia (left) had fixed slots, slotted flaps, spring-tab ailerons, fences and spoilers when it first flew to prove the airframe. After the Marboré jet had been fitted and it became the Sagittario (right) the wings were much cleaned-up.



Like some strange fish or reptile swallowing its prey, the Sagittario opens its mouth to give access to the Turboméca Marboré of 840 lb thrust. In later prototypes the cockpit, fitted with a bubble canopy, will be moved forward behind the turbojet and over the wing leading-edge.

up all the wing trailing-edge inboard of the ailerons, are power operated.

At this comparatively early stage in the flight trials, the spoilers have been found to be effective and we are informed that manœvrability generally, and rate of roll in particular, are of a very high order. The test pilot also told us that the machine was particularly stable at high speeds, there being no tendency to "Dutch roll."

The temporary tailwheel-arrangement was adopted simply to enable the aircraft to get into the air without delay. The wheel has a separate retracting system with its own individual lever. Being in the jet stream—though well back from the nozzle—the leg and tyre have been protected by heat-resisting metal fairings. The assembly is retracted rearwards by a hydraulic jack.

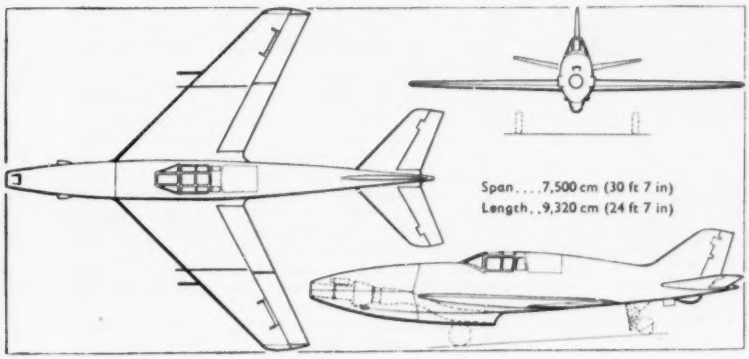
For take-off the pilot opens up and the present heavy tail is airborne after about 1,000 yards. At this point the tailwheel is retracted and the loss of its drag and jet-spoiling effect then allows more rapid acceleration for another 500 yards, when the machine takes off and the main wheels are retracted. For landing all wheels are lowered—the tail wheel on the approach—and thus the run is rather long, due to the reduced hold-off angle of attack.

The removal of the wing-mounted dive brakes, referred to earlier, followed the trial of the tailwheel as a brake. It was most effective for drag and thrust-spoiling, and proved to be excellently placed from the trim and structural points of view. Later, nosewheel prototypes will probably carry their dive brakes in this position.

The Marboré at present carries no airframe accessories, so a large ground-charged hydraulic reservoir is used. It is positioned ahead of the cockpit in the vacant bay existing, and can give power for two ups and downs each of the wheels and flaps. A hand pump in the cockpit (starboard-side lever) can be used for further operations or in emergency.

A nautical-looking fuel cock of three-position twist type is fitted in the cockpit. The Marboré is started and closed-down on petrol, but operates on kerosine; the starting cycle is a two-phase automatic one. The power-lever has a gated stop which looks after idling or, with step out, gives a total cut-out. The fuel is all contained in the fuselage behind the cockpit (in place of the S.7's second cockpit).

It is believed that the present main air intake is not as efficient as it could be. The installation is, however, a quickly designed temporary one, and, as the photograph shows, it is unusually accessible. The underside of the fuselage behind the jet outlet is shrouded against heat, cold air being scooped in beside the engine and fed back between outer and inner under-skins. The Marboré has air-cooled bearings, the outlet pipe for which can be seen protruding in the centre of the jet outlet where it exhausts down the jet stream.



The present Sagittario is heavy—some 4,500 lb—and the cockpit design is the same as that of the S.7. On subsequent lighter metal prototypes, of which there may be three, a bubble enclosure is to be fitted and the cockpit moved forward over the wing leading-edge. The fuel tanks can then be fitted mainly over the c.g. With the fitting of a nosewheel the mainwheel attachments will probably be moved back to the rear spar.

One comes away from a first encounter with the Sagittario impressed firstly by its attractive appearance but more perhaps by the practical and economical short-cuts taken by its designers and constructors in their desire to get flying experience as quickly and cheaply as possible. M.A.S.

TWO-SEAT RUNNER-UP

A Second-prize Winner in the Royal Aero Club Design Competition

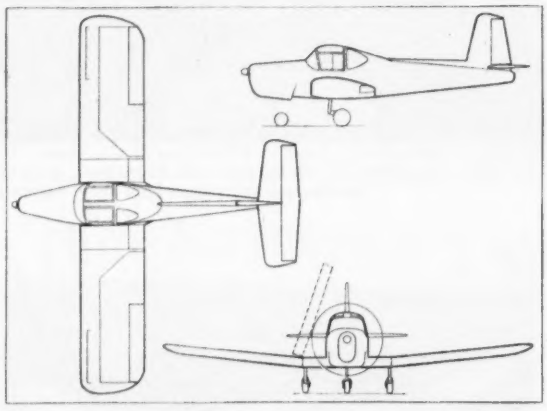
IT may be remembered (*Flight*, April 10th, 1953) that the first-prize winner in the two-seat tourer/trainer section of the Royal Aero Club's aircraft design competition was a design for an all-wood aircraft. The Australian entrants of this design chose wood for a number of reasons, among which they claimed lower cost, lighter structure-weight, and the assertion that a metal light aircraft would either have to use inordinately thick skin plating or become an extremely difficult structure to produce. It is therefore of interest to observe that the runner-up was a design for an aircraft of light-alloy construction, and a comparison between this design and the first-prize winner is instructive.

The designer of the second-prize winner was L. G. McFarlane, of Tottenhoe, Bedfordshire, and his design reflects careful consideration of the various uses to which the aircraft might be put, together with problems posed by mass production and world-wide use. His design, the general arrangement of which is given in the three-view drawing above, provides for a low-wing cabin monoplane with side-by-side seats, nosewheel-type undercarriage and conventional controls. The design looks eminently practicable and appears to be a fine balance between the latest methods of construction, without the introduction of unusual features.

Regarding the type of construction adopted, Mr. McFarlane appears absolutely confident in his choice of a light-alloy structure, giving as his reasons the wide demand for light aircraft in tropical and termite-infested countries; the fact that, while home-produced light alloy is plentiful, suitable timber has to be imported, with a high proportion of rejects during grading; a probable increase in time between major inspections as compared with a wood or steel aircraft (the latter, he says, being prone to severe rotting, glue deterioration and rusting); and—in spite of arguments to the contrary—the simplicity of minor or major airframe repairs.

It is not usual to find a light-alloy aircraft in this size and even less usual to find one in which the skin carries an appreciable proportion of the load. Mr. McFarlane says in his brochure: "Unfortunately it is necessary to make a compromise between structural efficiency and simplicity and, in the structure chosen, an attempt has been made to combine a cheap practical structure with one in which the skin works up to a fairly high average stress." He goes on to say that the most efficient type of construction would probably have been a thin skin with closely spaced, Redux-bonded stringers. This was obviously unacceptable, owing to the cost of providing heated dies for every joint in manufacture and the virtual impossibility of effecting simple repairs. In the event, the structure chosen has a fairly thin skin riveted to stringers, with the loads concentrated into heavier members at the major joints.

At the expense of a slight increase in all-up weight, the mainplane has been designed in three sections, the outer panels being arranged to fold upwards after withdrawal of the lower main-spar joint pins. (With the wings folded and the tailplane removed, the overall width is such that the aircraft might be towed by road.)



McFARLANE TOURER/TRAINER

Blackburn Cirrus Minor de-rated to 85 h.p.

General Data.—Span, 30ft; length, 23ft 4in; height, 8ft 9in; wing area, 154 sq ft; empty weight, 730 lb; gross weight, 1,260 lb; wing loading, 8.2 lb/sq ft; stalling speeds: 51 m.p.h. (without flap), 47 m.p.h. (with 40 deg flap C_L max=1.45); cruising speed at 2,300 r.p.m. at sea level, 104 m.p.h.; range on 15 gal against 20 m.p.h. headwind, 252 miles; take-off in still air, unstick at 54 m.p.h. after 187 yd, total distance to 50ft, 349 yd; braked landing over 50ft, distance to stop 331yd; rate of climb at 60 m.p.h., 785ft/min.

The general structure of the wing is clearly shown in the small sketch. The centre-section consists of a skin-and-stringer box structure between 30 and 74 per cent chord. The main-spar web at the 30 per cent chord position continues to the wing tip, and the "D" nose-section of the outer wing carries the bending and torsion loads. These loads are transferred to the skin/stringer combination and concentrated into booms at the root joints. Abaft the main spar the outer wings are fabric-covered. At 74 per cent chord is a light spar which in the outer wing stabilizes the ribs and carries the ailerons and in the centre section takes outer-wing drag loads and carries the flap. A single, plain flap is fitted over the whole span of the centre section and is manually controlled by a bungee-assisted lever which operates a direct push-pull rod.

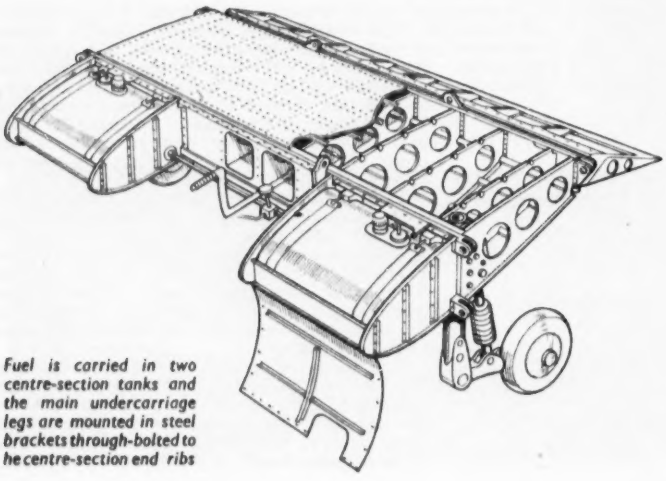
The fuselage structure—shown in a sketch on the next page—is made in centre and rear portions, with the top and bottom main longerons carrying the load between the fuselage sections and also carrying the Blackburn Cirrus Minor engine at the forward end. The engine, incidentally, is de-rated to 85 h.p. in accordance with R.Ae.C. requirements. Not only does this make for a cheaper and simpler power plant, but it permits the use of low-grade fuel—and also "keeps something up the designer's sleeve."

The skin of the centre-section carries shear loads only and the structure is stabilized by a number of light frames and external hat-section stringers. Overturn loads are taken by a longitudinal member in the cabin roof and by a crash pylon mounted behind the seats, the hinged members of which can be swung clear to facilitate the stowing of large items of luggage. Access to the cabin is gained *via* doors hinged to the windscreen frame; the maximum interior cockpit width is 39in.

The very simple tricycle undercarriage specifies levered suspension main units and a steerable nose-leg, shock absorption being effected in each case by rubber discs in compression, with friction damping. A particularly interesting feature is the linkage between the rudder pedals and the nose leg, such that the nosewheel is automatically centred and locked except when the control column is pushed fully forward. Non-differential mainwheel brakes are fitted, controlled by a fly-off hand lever.

Fuel is carried in two 7½-gallon centre-section tanks which can be removed through the leading edge as shown in the sketch.

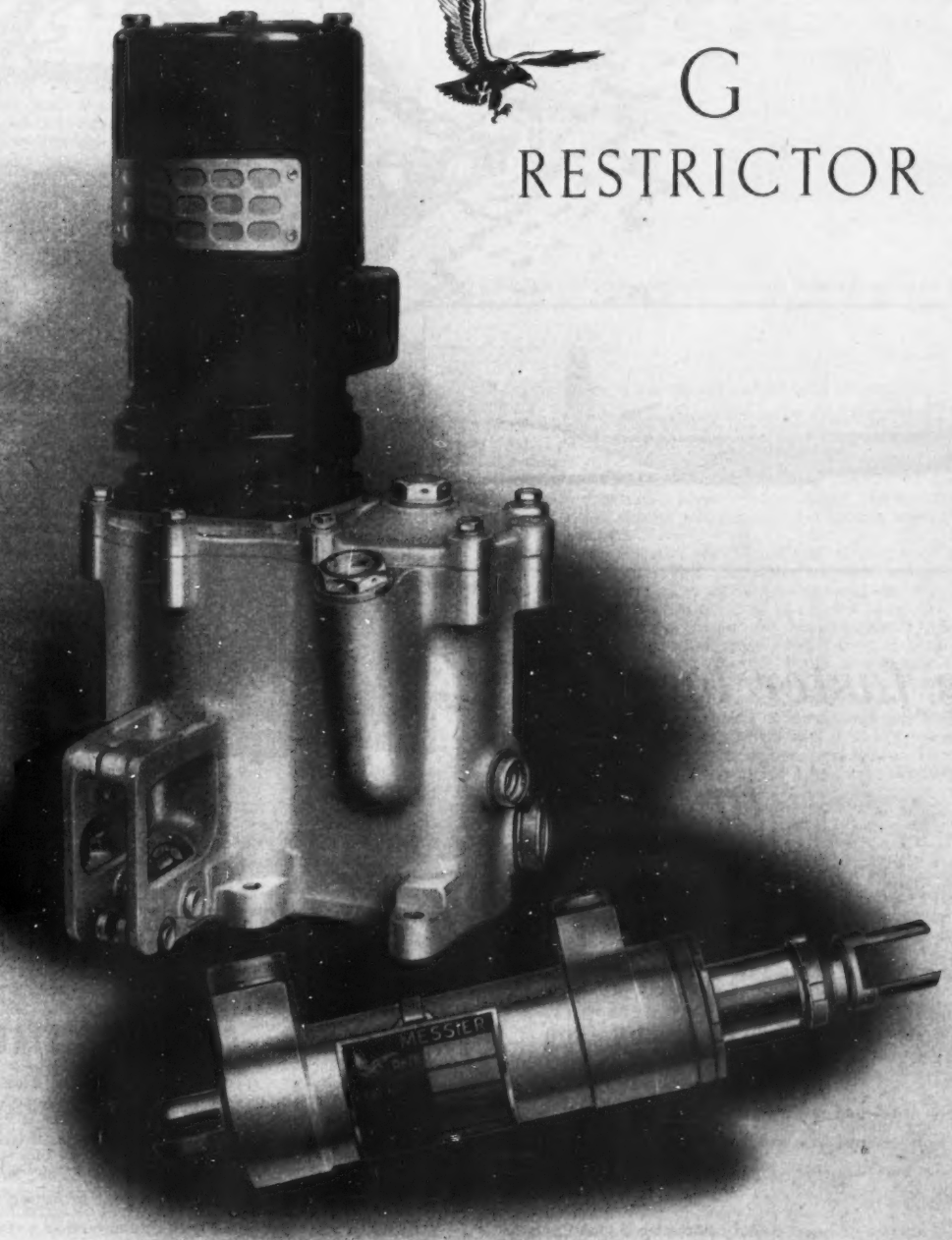
Simple sealed ailerons are used, with a marked differential action, and fixed outer-wing slots are



Fuel is carried in two centre-section tanks and the main undercarriage legs are mounted in steel brackets through-bolted to he centre-section end ribs

BRITISH MESSIER

G RESTRICTOR



A "G" Restrictor applicable to aircraft elevator controls has been developed by British Messier for the Ministry of Supply and has been satisfactorily flight tested.

BRITISH MESSIER LTD · GLOUCESTER

R/BM 008

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Then you will understand why your next flight to South Africa, the Middle East, the Far East or Japan must be by B.O.A.C. *Comet* jetliner. No other airline flies so far so fast . . .

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BRITISH OVERSEAS AIRWAYS CORPORATION

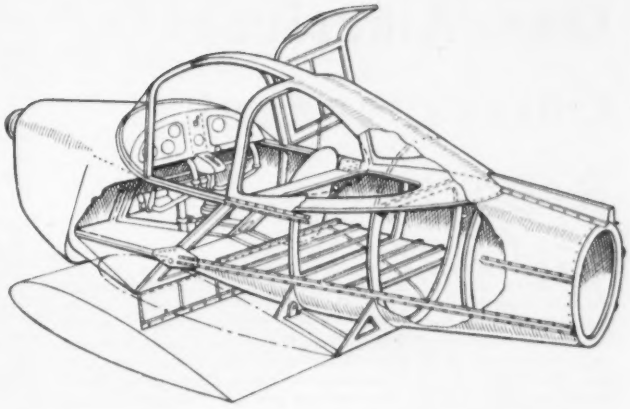
TWO-SEAT RUNNER UP . . .

fitted to improve behaviour at low speeds. The tail unit is very simple without either aerodynamic or mass balance; the elevators are mounted behind the rudder and have a Tiger-Moth-type spring-bias trimming system.

The fixed tail-surfaces are metal-skinned, but fabric covering has been adopted for the rudder and elevators. The elevators have an unusual leading edge, approximately an inversion of the usual shape; they are attached to the tailplane spar by piano hinges on the upper surface. The ribs in both the wing and tail are simple flanged pressings with lightening holes.

Particularly praiseworthy is the manner in which Mr. McFarlane has borne in mind the difficulties likely to be encountered by a private owner or club in maintaining an aircraft of this type. The whole structure is liberally provided with access panels and the complete airframe can be broken down into major sub-assemblies with unusual ease.

Calculated on the basis of an initial production batch of 50 aircraft, the overall cost appears likely to be some £1,250. This is made up of £16 in tooling costs (per aircraft), £720 for labour and overheads and £515 for materials.



The centre fuselage and inner wing unit is not only simple in structure but also has fine aerodynamic form. Behind the broad cockpit is the luggage boot.

WASHINGTON POST FOR MR. SCOTT-HALL

THE Minister of Supply, Mr. Duncan Sandys, has appointed Mr. Stewart Scott-Hall, C.B., M.Sc., F.C.G.I., D.I.C., F.R.Ae.S., to be Head of Technical Services, British Joint Services Mission, Washington, in succession to Sir Alwyn Crow, C.B.E. He will take up his appointment in about a month's time.

Mr. Scott-Hall

Mr. Scott-Hall is at present Director-General of Technical Development (Air) in the Ministry of Supply, a post which he has held since 1946. Now forty-eight years of age, he first joined the Aerodynamics Department of the Royal Aircraft Establishment in 1927, and has since held a number of increasingly responsible Government research and development posts.

Technical Services is the Ministry of Supply element in the British Joint Services Mission, Washington, and is responsible for liaison on defence research and development matters with the United States authorities.

VICTORIOUS PROJECT

EVENTS leading up to the first flight of the Victor, as seen by the makers' chief test pilot, are related in a noteworthy article in the *Handley Page Bulletin*. It was as long ago as 1947 that S/L. H. G. Hazelden, D.F.C., first learned of the project, and through the succeeding years he was able to watch a motley array of objects on the factory floor gradually grow into more or less recognizable shapes. Much of the cockpit layout was done with the aid of a mock-up, and the fuel system was tested by means of an ingenious mechanical rig set up at Radlett. S/L. Hazelden describes Sapphire-familiarization flights in a Hastings equipped with two of these units in the outboard position, and remarks that the aircraft would cruise quite happily on one Sapphire only. He tells of the sadly brief career of the H.P.88 crescent-wing research aircraft, resulting in the death of F/L. D. J. Broomfield; of the transportation to Boscombe Down of the Victor fuselage, camouflaged as a boat-shaped affair prominently labelled "Gelepandhy, Southampton"; of the impossibility of readying the Victor for the 1952 Farnborough display; and of a fire in the hydraulic system which caused another death, that of electrician Eddie Eyles.

Finally, all difficulties were surmounted, and at long last, on Christmas Eve, the weather cleared and the great moment had arrived for Hazelden and his flight observer, I. K. Bennett. Cockpit checks were completed, the four Sapphires started, and the Victor taxied out to the runway.

"I locked my radio on to transmit," writes S/L. Hazelden, "so that all that was said could be heard on the ground. In a matter of seconds now we would know if the Victor would fly. I opened the engines to fairly low power and released the brakes. The aircraft rolled up the runway, rapidly gaining speed. I pulled the control column back and the nosewheel left the ground. So far, so good. I held the Victor like that for a few seconds; the rumbling of the wheels ceased and I knew we were off.

"I kept close to the runway, still gaining speed, for a few more vital seconds, and then I knew it was all right. An imperceptible movement of the control column, and the ground started to fall away as we climbed.

"Smoothly, effortlessly, the Victor had slid into its natural element. By so doing it had become an aeroplane instead of just the expression in metal of so many drawings and hieroglyphics on paper. Whatever happened now, we all knew it could fly.

"After a few minutes in the air, my thoughts turned to landing. I had got the Victor up there; now, could I get it back again? I tried reducing speed to see how it would behave at a suitable speed for the approach. Once more it was all right and, coming in on a long, straight approach, I headed for the runway. Lower and lower we came, until the beginning of the runway was only a few feet below the wheels. I throttled right back, and in a few seconds the wheels started rumbling again and we were down. The Victor had come back to earth as smoothly as it had left. We had had a comfortable flight, with no anxieties."

MR. C. V. MURRAY

WE learn with regret of the death of Mr. Clifford Vernon Murray, deputy chief engineer of Armstrong Whitworth Aircraft, Ltd., which occurred at his Coventry home on April 11th. Married, but with no children, Mr. Murray was 58 years old and had been ill only a short time.

Born in Derby, he began his acronautical career 36 years ago with the old Siddeley Deasy Co. Three years later he was selected as chief draughtsman for Sir W. G. Armstrong Whitworth Aircraft, Ltd., when it was formed as a separate organization. In 1936, he became assistant chief designer, holding that post until 1948, when, as deputy chief engineer, he transferred his considerable designing experience to the guided-weapons field. Just before taking up this work Mr. Murray undertook an extensive tour of the Far East at the invitation of the Ministry of Supply to study problems of operating aircraft under tropical conditions. Mr. H. M. Woodhams, A.W.A. managing director, has recorded the following appreciation: "My staff, with me, mourn not only the loss of a powerful figure in our affairs, but also a friend generously endowed with gifts which, unselfishly, Mr. Murray was ever ready to place at the service of others. He had that capacity to inspire those around him and, with a whimsical turn of phrase, released tensions; he had a rare sense of humour.

Mr. C. V. Murray

Our American Correspondent Reports . . .

AS this newsletter has previously remarked, the matter of flying safety is much in people's minds in the United States today. As one of the carriers here says about its excellent accident-free record, "Safety is no Accident," and it has always been recognized that you get safety only by working hard for it, both on the ground and in the air. Lately, however, there has been a better appreciation of the fact that the problem must be considered from the moment that the first draughtsman puts pen to paper, and unless safety is designed into the product from the beginning—whether complete aeroplane, or engine, or accessory—it is hardly likely to come along of itself at a later date.

It is this primary-thinking approach that an organization known as the Flight Safety Foundation has been preaching. And the doctrine was probably necessary. For there was, and still is in many fields, an American tendency to ignore the fundamental approach, and to rush past the period of contemplation in an eagerness to get on with the job. The result is that troubles that should never have been allowed to occur in the first place often have to be cured at a later stage. It has sometimes been so with air safety. One has frequently heard discussions as to how to cope with some emergency—let us say fire—once it has occurred, whereas a little attention might well have been paid in the original design to preventing a fire in the first place.

The Flight Safety Foundation—which is now a branch of the Guggenheim Foundation—is supported by voluntary contributions and is a non-profit-making organization. It must have had a hard struggle in its early days, but now—to judge by its bulletins and monthly reports—the corner has been turned, and its work is beginning to have a real effect on the thinking of both designers and operators. It would probably have been impossible to develop an equivalent organization in England; but here, where a committee can be set up and given a name and an alphabetical title and get supporters at the drop of a hat, and where it is easier to raise the funds necessary for such a project, the imagination of a few interested people has proved most productive. Yet it was principally the foresight and energy of one person—Mr. Jerry Lederer—that was and still is responsible for the organization's final success. We believe that the summer meeting of this Foundation is to take place in Europe this year, when British operators and others who would not normally be able to attend will be able to get a chance to see and hear the kind of work which it does.

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SO far as airline accidents versus other modes of transport are concerned, the following recently-published statistics are interesting (if only to show how dangerous it is to drive a car!):—

	Total Number of Deaths 1952	Rate per 100 Million Passenger Miles 1952*	1951
(1) Scheduled U.S. domestic air transport	46	0.38	1.3
(2) Scheduled U.S. International air transport	94	3.1	1.1
(3) Irregular U.S. non-scheduled air transport	26	2.1	7.4
(4) U.S. railroads	150	—	0.43
(5) U.S. inter-city buses	130	—	0.22
(6) U.S. passenger cars and taxis	21,000	—	2.4

* Estimated.

A strange thing about the accident figures for the American airline operators, international and domestic combined, is that, although the number of aircraft miles flown has increased tremendously, the accident and fatality rate has (with the exception of one bad year) remained more or less the same. This is clearly shown in the following table:—

Year	Aircraft Miles Flown (×1,000)	Number of Accidents Total	Fatal
1938	75,282	29	7
1940	119,467	35	3
1942	127,225	25	5
1944	149,114	31	4
1946	356,405	43	11
1948	414,755	64	6
1950	439,920	40	6
1952 (est.)	543,000	35	6

The year 1946 was the black one for fatal crashes and its evil record was due largely to the introduction of larger and faster equipment for which neither the operators nor the navigational or ground approach facilities were really prepared. Quite why 1948 should have had so many accidents—most of them, luckily, non-fatal—is unknown, but it may also have been due to the introduction of new types. It is a subject for congratulation, however, that from February 28th, 1952, to February 28th, 1953, the American domestic carriers did not have one single fatality—a remarkable achievement.

◆ ◆ ◆

ANOTHER occurrence here that, if it develops, won't half put the cat among the pigeons is a proposed amendment to the United States Constitution, put forward by a Senator Bricker of Ohio—never distinguished for his international outlook—and for which he has some considerable backing in the Senate. This would require, *inter alia*, that all those international agreements normally negotiated by the State Department and signed by the President would in future have to be submitted for Congressional approval. Furthermore, agreements already in force would be declared invalid and would have to be submitted also. (This would affect international agreements apart from civil aviation, and one of the papers went so far as to say that it would "cripple the President and the State Department in the conduct of international negotiations." This is not the first time this idea has come up (there was a flurry of similar suggestions after the last Canadian-U.S. bilateral aviation agreement) and although it never got far under the Democrats, who realized its dangers full well, it may do better now. But all those countries which have bilaterals with the United States are watching developments like a lot of hawks. For if the U.S. invalidates any bilateral, the other party would presumably have the right to do so too, thus cancelling the agreement, and there are not many countries which would not be glad of a chance to cancel and re-negotiate, and try and alter clauses which they now feel may be working to their disadvantage. Of this fact the State Department and the American international carriers are only too well aware, so there must be some concern in Washington as to the outcome of this particular piece of proposed legislation.

There is another point which might be detrimental to the foreign countries concerned, and that is that final approval could be more dependent on the mood of Congress, or the pressure from interested parties, than on the international wisdom of the arrangement. Delays, too, could occur—but whether these would be any greater than those which might, and sometimes do, occur under the present C.A.B. regulations (which one presumes would be cancelled) remains to be seen.

◆ ◆ ◆

THE British film *The Sound Barrier* (released in the United States as *Breaking Through the Sound Barrier*) has had quite a success in New York. After a run at a Broadway theatre it has now gone out into the country, where it is said to be doing as well, if not better, than it did in the Big City. But not all the technical comment has been 100 per cent favourable, and the following editorial from a recent issue of *American Aviation*, by Mr. Wayne Parrish (again), puts forward a point of view which has been mentioned on more than one occasion by aviation people who have seen the film:—

HOW WAS THAT AGAIN?

Whenever the British find themselves lacking in a first of some kind they make up the deficiency by producing a movie. And when it comes to producing good movies the British can rightfully claim supremacy over Hollywood hands down. But sometimes in their eagerness to keep up the morale of that tight little island they have a way of dispensing with facts. Very gracefully, mind you, but with a completeness that is sometimes astonishing as well as awe-inspiring nonetheless.

We finally got around to seeing *Breaking the Sound Barrier* which, as movies go, is very excellent. But in their enthusiasm the producers got so mixed up with the facts that every viewer of the movie could but conclude that it was the British, not the Americans, who first achieved supersonic flight. At one point in the film there was a tense moment when somebody mentioned that the Americans were also at work on the sound barrier, but that was the last of it. Otherwise the British came out absolutely supreme, complete with tears, personal tragedies, frumpled chief engineer, and all that. Now mind you, the film didn't come out and *say* that the British were first—it just left a very neat impression with the viewers. Nice work if you can get it.

Frankly, one feels that Mr. Parrish is right in what he says, and that he is justified in taking the producers to task for not making it clear that the Americans were the first deliberately to exceed Mach 1, and with an aircraft designed for that purpose. It would not have been difficult to make some mention in the dialogue of the film and give credit where it was due. It would have been generous, honest and historically accurate. After all, we get hot enough under the collar when anyone suggests that Lindbergh made the first non-stop Atlantic flight.

FAIREY GANNET

ANTI-SUBMARINE SUPER PRIORITY

..."Anti-submarine weapons, both shipborne and airborne, far more effective than anything known during the last war, are becoming available, and arrangements have been made to enable heavier and faster types of naval aircraft to be handled in, and operated from, our fleet carriers."

Extract from the Statement by the First Lord of the Admiralty explanatory of the **NAVY ESTIMATES, 1953/54.**

FAIREY AVIATION

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Comet 1 aircraft with de Havilland Ghost engines have cut the time for the London–Tokyo journey from 86 hours to 36 hours.

The Comet 2 and the Comet 3 will do progressively better.

DH

AIRCRAFT INTELLIGENCE

FRENCHMEN—FIERCE AND GENTLE: The promising S.O. 4050 Vautour (top) is seen on the runway at Melun-Villaroche. Below it is the little Farfadet convertiplane, which is being flight-tested at Villacoublay. Both are referred to on this page.

Great Britain

Vickers-Armstrongs Valiant. The second prototype WB 215 is now back at work after a spell on the ground at Wisley. The Italian journal *Alata* quotes the following figures for the aircraft, and we repeat them for what they are worth: wing area, 2,000 sq ft; all-up weight, 120,000 lb; max. speed, 500 m.p.h. If they are meant to refer to production Valiants, these data are hardly likely to be accurate.

France

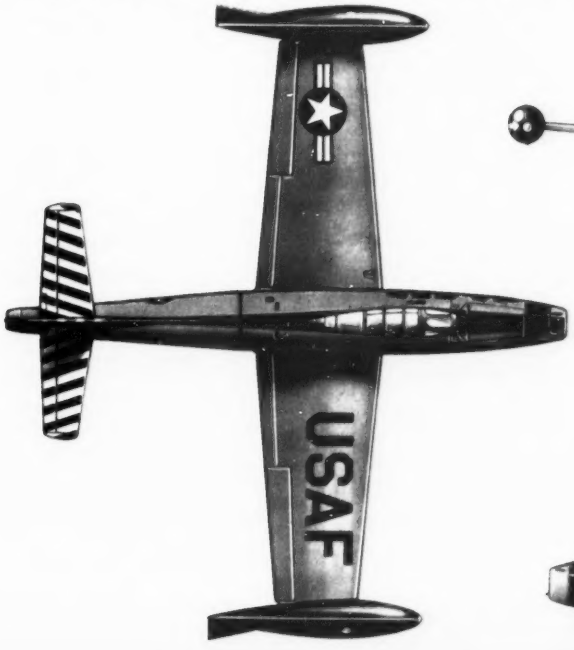
S.N.C.A.S.O. 1310 *Farfadet.* Illustrated on this page is the first French convertiplane—and, with the Fairey Gyrodyne, the first such aircraft in the world to reach the flying stage. The rotor is driven by compressed-air jets at the tips—no fuel is burnt in them—which are supplied by a fuselage-mounted Turboméca Arrius II gas-turbine air-compressor of 360 h.p. The airscrew, used for propulsion in forward flight, is driven by a nose-mounted Turboméca Artouste turboprop of similar power. Much of the lift in forward flight comes from the small fixed wing, so unloading the rotor and increasing the cruising speed over that possible with a normal helicopter. Although only intended as a test-bed, the Farfadet (the name means Hobgoblin, elf or leprechaun) can, it is claimed, carry a pilot and two passengers at 150 m.p.h. for 250 miles.

S.N.C.A.S.O. 4050 *Vautour.* Illustrated on this page, the first Vautour prototype bids fair to herald big production of the most useful French military aircraft for many years. A single- or two-seater, it is intended for all kinds of night and all-weather fighting, bombing, close-support, reconnaissance, and other duties. The aircraft sits on the ground like a B-47, the bicycle undercarriage being novel in layout and—it is reported—successful in service. The outrigger wheels fold up alongside the axial turbojets. At the moment these latter are Atars, but it is hoped that the S.N.E.C.M.A. Vulcain of 11,000 lb thrust will be available for production Vautours, which should then be supersonic in level flight. The Vautour has thin, flexible wings with fences and double-slotted flaps. Most of the fuel is housed in the fuselage, together with the heavy offensive load. An all-flying tail is fitted and the nose houses a large scanner. Initial flight-testing has been completed, and the French Government hope that the aircraft will "get a favourable nod" from NATO.

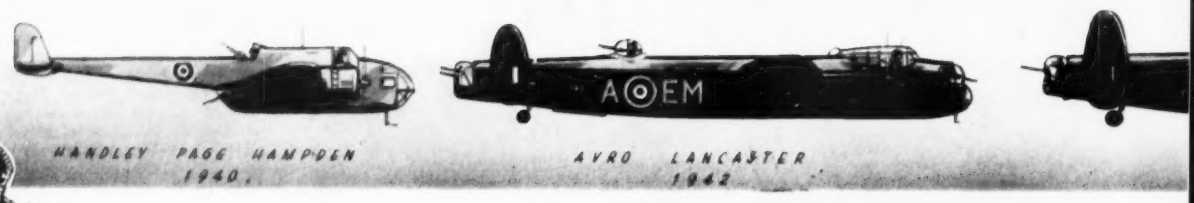
United States

Convair Deltas. Our American contemporary *Aero Digest* has published additional facts about the Convair F-102 and XF2Y which appear to be accurate and to have official approval. The F-102, a single-seat fighter for the U.S.A.F., is a far larger aircraft than was originally assumed, the span and length being 60 and 75ft, while the tip of the triangular fin reaches to a height of 40ft. Power is supplied by two Pratt and Whitney J57 turbojets with a total of about 30,000 lb thrust. Empty and all-up weight is quoted as 25,000 and 40,000 lb and the limiting Mach number is given as 2. The XF2Y Sea Dart, hydroski fighter for the Navy, is given a span, length and height of but 3cft 6in, 41ft 2in, and 21ft 1in (with skis extended) respectively, although its general configuration parallels that of the Air Force machine. Gross weight is 22,000 lb.

Sikorsky S-55. In service with the U.S. Marine Corps this familiar helicopter is known as the HRS series. The first versions—used for a multitude of duties in Korea—were powered by the 550 h.p. Wasp R1340 engine. Later types, like the HRS-3, have the 700 h.p. Wright R1300 and it can now be stated that the HRS-4 is fitted with a Wright R1820 Cyclone of 1,025 h.p. The HRS-4 can, as a consequence, carry 10 combat-equipped troops.



REPUBLIC F-84G Thunderjet
(Allison J35-A-29)
Span ... 36ft (37ft 5in over tanks)
Length ... 38ft



No. 207 Squadron *HISTORY OF A FAMOUS BOM*

BAD weather at the end of 1941 restricted operational flying, and this uneventful period persisted into 1942. Then, at the end of January, came the news that No. 207 Squadron's Manchesters were to be replaced by Lancasters. At Bottesford, No. 207 Conversion Flight came into being and the first Lancaster arrived on the 25th. Replacement crews from twin-engined medium bomber units were required to put in 40 hours' flying on Manchesters and Lancasters, finishing up with an eight-hour trip—half in daylight and half in darkness—with full war load at 20,000ft. Only "circuits and bumps" were made on Conversion Flight aircraft; for cross-country work the squadron aircraft were used. On the other hand, Conversion Flight crews and aircraft were required to operate during maximum efforts by Bomber Command.

For the first 1,000-bomber raid—on Cologne, on the night of May 30th, 1942—No. 207 had 12 Lancasters detailed for the attack; it was the first time the unit had operated so many aircraft. All of them attacked the primary target and all returned to base. Bombing was done from between 14,000 and 15,000ft. All the crews on their return spoke of the inferno below. "... one huge fire and hundreds of others scattered around ... incendiaries lost in a maze of fires ... impossible to locate any individual bomb-burst ... a mass of flames, with a smoke pall up to 10,000ft ... defences seemed completely bewildered ... fires seen from the Dutch coast." These were some of their recorded comments.

The second 1,000-bomber raid, two days later, was against Essen; but this time the squadron was not quite so fortunate. Fourteen Lancasters were detailed, but four returned with engine trouble. It was a successful raid, but observation was difficult owing to fog.

On the third 1,000-bomber raid, on June 25th, 15 Lancasters of No. 207 joined in the attack on Bremen—primarily to hit the Focke-Wulf aircraft factory. This raid was handicapped by complete cloud cover over the target. Bombs had to be dropped by D.R., but extensive fires were observed through the clouds. Conditions above cloud were like daylight: there was a brilliant moon and the Northern Lights were playing.

In August the unit moved to Swinderby. The use of Lancasters had soon put a different complexion on operational flying, and by September the squadron had settled down to a period of really hard work. During the month no fewer than 83 sorties were made on targets such as Saarbrucken, Karlsruhe, Bremen and Duisberg. "Gardening" (sea-mining) was also done. Although many of the Lancasters came back in damaged condition, only two were lost.

In the next month came the big daylight raid on the Schneider armament works at Le Creusot in France. The first Lancaster left at mid-day and was over the target at 1809½ hr, attacking from 4,500ft. The remainder of the force of 13 arrived at short intervals and, in conditions of good visibility, the target was accurately attacked. The only opposition appears to have come from a partridge, which hit the port outer Merlin of "C" and rendered it unserviceable. The round trip in daylight took nearly ten hours.

(Top) W/C. F. R. Jeffs, D.F.C., who commanded No. 207 Squadron in 1942.

(Lower) S/L. W. D. B. Ruth, D.F.C. and Bar, who also served with the squadron in 1942.

The C. O., W/C. Jeffs, wishes aircrew

An even longer daylight raid, this time to Milan, was made a few days later. Ten Lancasters took off shortly after noon, but one returned with its intercom u/s and front hatch gone, and another came back because its rear turret was out of action. "B" was lost. The remaining seven were over the target from 1700 hr onward and attacked from heights varying between the lowest at 4,500ft ("Q") and the highest at 12,000ft ("T").

No. 207 seem at this time to have made a corner in Italian targets, for in November Genoa and Turin were each attacked more than once.

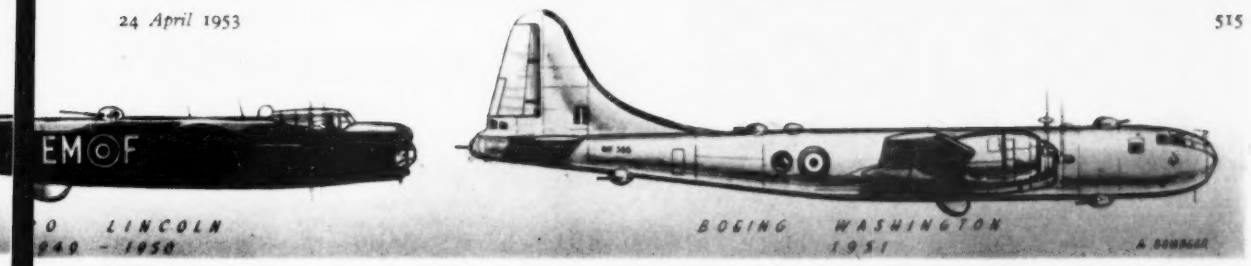
A busy year finished with a ten-tenths cloud attack on Munich. Most of the Lancasters released their bombs after a time-and-distance run from Lake Würmsee. Of the 12 Lancasters participating, one failed to return.

Essen and Berlin seem to have been the main targets for January, 1943, by which time the pathfinder technique was well established. The positioning of the T.I. markers came in for as much comment as other results seen during the attack. It was on a Berlin raid on the night of January 16th-17th that the first 250-lb target-indicator was used. For this raid No. 207 contributed 13 Lancasters.

In February came another change in command, W/C. Parselle taking over. Most of the raids during the month were against Germany—they were particularly heavy on Nuremberg—but Turin, Lorient and Milan were also visited. Of the 90 sorties flown, 76 were successfully completed and 11 were abortive; three aircraft failed to return. Just over 287 tons of bombs were dropped and flying hours (day and night) totalled 707.

By March, 1943, the intensity of Bomber Command's attack was being rapidly stepped up. Almost every evening saw eight, ten and sometimes eleven of No. 207's Lancasters disappear into the eastern sky. During the month no fewer than five failed to return—a loss of 35 aircrew. These operational sorties were made in addition to quite an amount of training flying—including practice with Gee, which was then coming into general use. This aid first appeared in March, 1942, but more than 12 months later it was still suffering badly from unserviceability.

"O" Orange on display in Trafalgar Square in March 1943, in aid of "Wings for Victory" week.

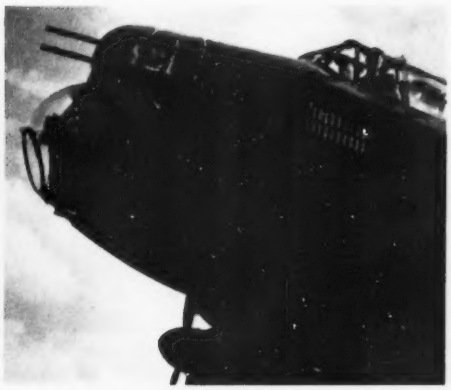


BY JOHN YOXALL

R UNIT

PART 2*

k before they take off.



"F" Freddie, a veteran with 22 operations to its credit.

One of No. 207's Avro Lancaster 3 bombers from Spilsby in October, 1943.

Near the end of May the C.O., W/C. Parselle, was reported missing in an attack on Düsseldorf. It was his third operation during that month, the other two being against Dortmund and Pilsen. No details were available of how the Lancaster was lost. In fact there was very little engine or airframe unserviceability at this time—neither does there appear to have been much damage from enemy sources. Later it was known that W/C. Parselle was a prisoner of war.

It was in June, 1943, that the "shuttle service" raids were started. The aircraft for the first of these operations took off from Langar, near Nottingham, attacked the Zeppelin works at Friedrichshafen and then flew on to land at Blida in North Africa. On the return journey Spezia was attacked. Each half of the flight lasted between nine and ten hours. During this first shuttle raid an immediate D.F.C. was won by P/O. J. McIntosh. Shortly after take-off the starboard outer Merlin of his Lancaster cut, but he continued to the target, which he bombed, and then proceeded to North Africa. He found that the engine would run for periods of up to an hour, and during the flight it was feathered six times. In the following month McIntosh received a Bar to this decoration.

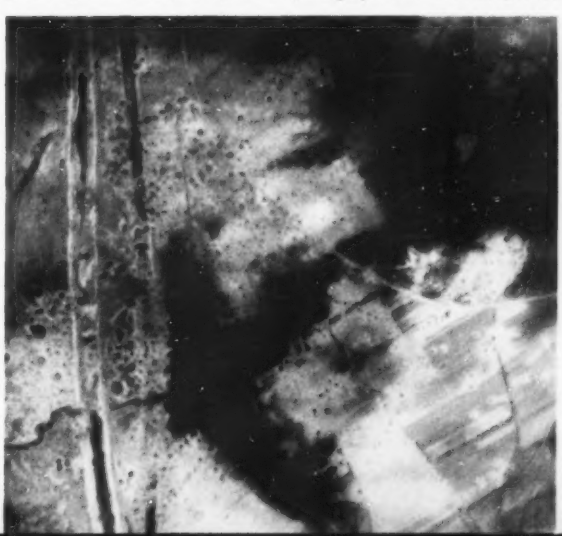
For trips to Italian targets and on to Blida the Lancasters were able to carry about 5,500 lb of bombs, whereas on Ruhr targets the total load usually comprised 1 × 4,000 lb "cookie," 4 × 500 lb, 6 × S.B.C. (small-bomb containers), each holding 8 × 30 lb, incendiaries, and 6 × S.B.C. of 90 × 4 lb incendiaries. "Bundles" were also dropped. This was the first reference to the use of "Window" (code-name for metal foil) to fox enemy radar.

In August, 1943, the squadron operated no fewer than 31 Lancasters on these shuttle raids and, altogether, 123 aircraft attacked primary targets. A total of 503 tons of bombs was dropped; five machines were lost. One of these raids—on Hamburg—was particularly difficult, there being electrical storms and, at 18,000ft, severe icing. "O," a Lanc 3 captained by Sgt. Bremner, was struck by lightning and had both port inner and starboard outer engines put out of action. He arrived back more than two hours late. Another Mk 3 (P/O. F. B. Solomon) went out of control over the target and fell from 19,000ft to 8,000ft before control was regained—and Hamburg bombed from that low altitude.

It was surprising how seldom the Lancasters were picked up by enemy night fighters; when they were, they gave a good account of themselves. A typical case was that of aircraft "J," F/O. A. Hollings, during an attack on Berlin. On the final leg of the journey to the target, "J" was attacked from the starboard side by a single-engined fighter, probably an Fw190, which was unseen until it fired from less than 400 yards. The Lanc was hit and the bomb aimer and flight engineer wounded. Rear and mid-upper turrets drove the fighter off, but the bomb aimer was hit and the bombs had to be jettisoned over the target. After leaving the target area the aircraft was coned by searchlights for a full five minutes, but Hollings evaded them by diving some 4,000ft. Twenty minutes later a twin-engined night fighter put in an appearance and was seen attacking another bomber. As it broke away, the rear gunner opened fire and shot it down in flames. The squadron diary records that the remainder of the trip was "completed without incident"!

On September 27th-28th a Lancaster captained by P/O. D. W. Cosens also had a near do. The fighter was not seen until it started firing, and the first burst put both rear and mid-upper turrets out of action. The rear gunner was seriously wounded and the mid-upper hit in the leg. The aircraft went out of control

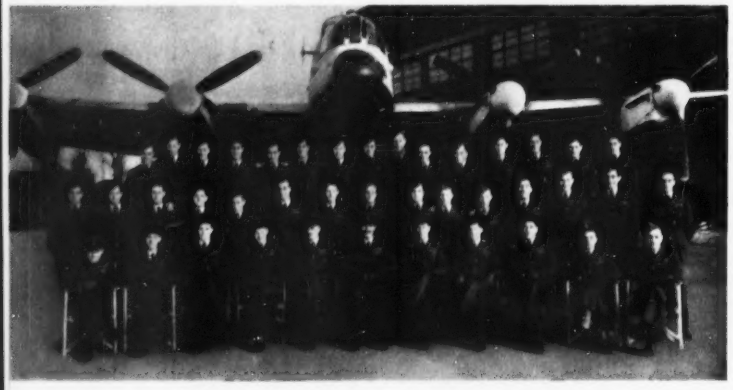
Results of a raid in which No. 207 joined. *(See page 517).* *After the third or fourth attack on this section of the Dortmund-Ems canal, the countryside was so churned up and waterlogged that equipment could not be got into position to effect repairs. A photograph taken in March, 1945.*



* *Part I of this article appeared in last week's issue.*

One of No. 207's Washingtons seen through the bomb-aimer's panel of another squadron aircraft; a "Flight" photograph taken last November.

At Stradishall in 1947: In the centre, seated, is the C.O., S/L. P. J. S. Boggis; on his right are S/L. A. G. Douglas and F/L. S. Webb; on his left are F/O. F. E. J. Marshal (adjutant) and F/L. P. C. Bargh.



No. 207 Squadron . . .

for some 3000ft and, on recovering, was immediately re-attacked, further damage being caused. The pilot had to press both feet on one rudder pedal to keep straight. Several fires burning in the fuselage were put out by extinguishers. W/T. was working under emergency conditions, petrol was short and height was not being maintained. The crew prepared to ditch, but eventually just made Hardwick after being shot at by our own A.A. guns as the coast was crossed at Lowestoft.

Yet another hazard suffered by bomber crews showed itself on another Berlin attack, late in November, 1943. Over the target a bomb aimer's compartment was wrecked in a collision with another Lancaster, and its occupant, Sgt. Shimield, disappeared. The pilot, P/O. W. H. Baker, suffered from severe frostbite during the journey home.

By the end of 1943 it was usual for No. 207 to supply 15 aircraft for operations and in November there were "nil" early returns out of 80 Lancaster sorties. A move had been made from Langar to Spilsby. In December the Germans tried different night-fighter tactics. They worked in pairs, one dropping flares and the other attacking any aircraft illuminated by them. Illuminated track-indicators on the ground also showed the defenders the route of the bomber stream.

On the first day of 1944 twelve aircraft were sent to attack Berlin. One of two which failed to return was captained by Lt. F. B. Solomon, U.S.A.A.F., who was with the squadron on exchange. He had completed 24 successful sorties.

Four days later, during a raid on Stettin, there was a truly amazing occurrence. P/O. D. C. Balfour, while over the target, collided with a Ju88 night fighter. The Lancaster's port wing was damaged; Balfour was able to claim the Ju88 as destroyed. A little over a week later the same pilot and his crew failed to return from a raid on Brunswick on the night of January 14th.

On this same Brunswick raid P/O. Gallagher's Lancaster was badly shot up. Near the target the port outer engine failed and, as height with full load could not be maintained, two S.B.C.s, each holding twelve 30 lb incendiary bombs, were jettisoned. While on the bombing run the Lancaster was attacked by an Fw 190, and the ensuing air battle lasted for some 25 minutes, during which time the Focke-Wulf came in eight times. Both turrets suffered damage, as did the port inner Merlin, the rudder and the elevator. Unable to keep height, Gallagher sent out a distress signal, but later cancelled it. On reaching England the crew elected to stay with the aircraft for a landing. On touching down one main landing wheel came off and the port wing came away. The crew had taken up crash stations, and, except for the flight engineer, they escaped unhurt.

By February (1944) the striking power of the unit had increased even more, as many as 21 aircraft being detailed for operations at one time. This increase meant that extra care had to be taken to avoid collisions over the target, where the concentration was getting to be very intense.

No. 207 Squadron could be called the scourge of Berlin. Night after night the unit's Lancasters attacked the German capital, each taking one 4,000-lb "cookie" and a vast number of incendiary bombs.

Entries in the squadron diary for April, 1944, disclose the use of H2S as an aid to navigation and bombing. Previously, this aid was mysteriously referred to as "X," being very hush-hush indeed.

Occasionally the squadron took part in raids on targets in France, the greatest pains being taken, and severe risks faced, to make sure that only the essential target area was hit. Whereas over Germany it was usual to bomb from 17,000ft and upwards, over France it was more usual to come down to 7,000ft or even lower. Reports on one such attack—on the marshalling yards at Tours, on the night of April 10th—show a great regard for the accurate positioning of the bombs.

For May, 1944, 137 aircraft attacked primary targets, involving 688 hours of operational flying; 630 tons of bombs were dropped and six aircraft lost. The C.O., W/C. J. F. Grey, received the D.F.C.

With the approach of D-day the main focus of attack moved to France, and on the fateful morning of June 6th nine Lancasters from the squadron attacked Caen; all returned safely. The same target was again hit by 19 aircraft on the 12th, but the big effort was against the stations from which the Germans were launching the pilotless V.1 flying bombs. For these targets the 1,000-lb bomb was employed.

July, 1944, was a bad month. On one raid alone, against St. Leu d'Esserent, five Lancasters were lost out of a total of 16 sent by the squadron. Daylight raids against flying-bomb sites were made, and during the month W/C. Grey, the commanding officer, claimed three enemy fighters destroyed—an Me 109 on the 12th and (while the squadron was raiding Stuttgart) two more on the 28th. On this last operation F/O. Grant claimed three fighters destroyed and F/O. Montgomery two fighters and a flying bomb. For the month, however, 12 Lancasters were lost—out of a total of 155 aircraft-sorties that reached their primary targets.

Memories of the emergency landing grounds at Manston and Woodbridge, which had "Fido" installed and runways 250 yards wide, are recalled by an entry in the squadron diary for July 5th, 1944. The Lancaster 3 captained by F/O. P. G. McIntosh was attacked by fighters over the target at St. Leu d'Esserent. The entry in the diary laconically states: "Rear gunner and flight engineer injured, one Me 109 shot down. Aircraft landed at Woodbridge." No mention is made of the state of the Lancaster, and one wonders what its condition actually was.

That the enemy fighters did not have it all their own way is evidenced by the foregoing; and later the same month the crew of the Lancaster I captained by F/O. D. M. Grant claimed the destruction of an He 410, which was seen to burst into flames and hit the ground.

The figures for August, 1944, show very plainly the degree of air superiority achieved at that date. Out of 194 Lancasters attacking their primary targets only two failed to return. Many of the raids were in daylight against flying-bomb sites, but others were against such tough targets as Brunswick and Stettin.

The attack on the 15th was by eight aircraft, in daylight, against airfields in the Arnhem area. It was on this operation that one of the Lancasters was lost. It was captained, strangely enough, by a Dutchman, F/L. Overgaauw. When within 20 miles of his home town in Holland the Lancaster was hit in the bomb bay by flak and exploded.

For the month nearly 1,000 tons of bombs were dropped—the actual figure was 997.

September 26th saw No. 207 out in its greatest strength up to that time. Twenty-two aircraft were detailed for operations, 22 took off to attack Karlsruhe, and all returned safely to base, with F/O.s Middleton and Price each claiming a fighter destroyed. Two other crews had combats, but made no claims.

In October the unit had the unhappy task of breaching the sea-walls and dykes on Walcheren and West Kapelle. The areas had been partially flooded by the Germans. Today, it seems extremely hard for the Dutch that, having only just got this land again under cultivation, the recent disastrous floods should submerge it again.

A quite remarkable occurrence happened during the take-off of 20 aircraft to bomb Hamburg. One of the Lancasters swung on take-off and crashed into a dispersed Halifax, the bomb load of which exploded, destroying two more Halifaxes and damaging several others. The crew of the Lancaster miraculously escaped

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With equipment on the "prayer mat," a Washington crew are briefed. Nearest the camera is Sgt. M. Sewell. His father was in No. 207 in 1928 and lent the early photograph of Air Chief Marshal Sir William Elliot.

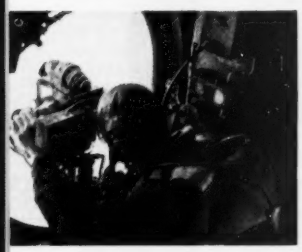
WASHINGTON CREW STATIONS

Captain, F/O. E. M. Balcombe.

Engineer, Sgt. K. P. Martyn.

Signaller, F/Sgt. P. G. Palmer.

Central fire controller, F/Sgt. G. Warren.



Right scanner, Sgt. M. Sewell.

Radar navigator, F/O. D. S. H. Lyons.

Left scanner, Sgt. E. J. Lamb.

These "Flight" photographs of some members of a 207 aircrew at their posts were obtained during a flight in a Washington.

No. 207 Squadron . . .

unhurt, but only 13 aircraft were able to get away that night.

On November 4th No. 207 contributed 13 Lancasters to a very successful attack on the Dortmund-Ems Canal. Thirteen was not an unlucky number on that occasion, for they all returned safely to base. Each carried 14 × 1,000-lb bombs. A coincidence is that the master bomber on that raid was W/C. Maurice A. Smith, now the Editor of *Flight*. From memory, he gives the following account of the attack:

"The attack on the embankment of the Dortmund-Ems canal at Ladbergen, north of Munster, on the night of November 4th-5th was an example of how training, planning and full provision for eventualities can lead to a highly successful attack. It was also one, however, which taught a lesson and indicated how on another occasion even greater success could be achieved. It was my first Mosquito night operation as controller (or master bomber), and it started badly. As we took off from 54 Base, Coningsby, one airscrew "ran away" at about 500ft and I was forced to put down at once at Woodhall Spa, the circuit of which overlaps with that of Coningsby. With my navigator I raced for the reserve Mosquito which 627 Squadron always kept standing by. The fact that this was a Mk 4 with many superficial differences compared with the Mk 20 which I normally flew, wasted me at least a minute in the dimmed cockpit.

"We got off successfully, about ten minutes late, and, if I remember rightly, made the Dortmund-Ems Canal, with throttles wide open, in 63 minutes dead—just as the first T.I. went down. I had already identified by V.H.F. with S/L. Churcher, marker leader and deputy master bomber, and told him I was late, and so he started to assess the marking for me. The night was cloudless, slightly hazy and dark, and occasionally it was possible to see the silver-thread reflection of the canal.

"The first red T.I. looked accurate enough, although it was a hundred yards or so to the north-east of the canal. At that point there are two branches running roughly parallel, like main railway lines. The intention had been to put the marking on the central strip or island between the water courses. Nearby there were some lock gates, and the River Glane runs across under the high canal embankment.

"Quite a lot of light flak was expected from the many known gun-emplacements at this section, but in fact only a few guns opened up and they went silent as soon as the attack began. Although between 150 and 200 Lancasters of the main force were concerned in the attack—each carrying 14 × 1,000 lb G.P. bombs—it seemed to be over in only two or three minutes. In fact, I believe the last machine dropped its load about nine minutes after zero hour. The result was the best concentration that No. 5 Group had achieved up to that date, all but five per cent of the bombs being contained in a circle of about 500 yards radius.

"Both branches of the canal were completely drained, and the eastern channel for a hundred or more yards became an unrecognizable quagmire. The western channel was less affected and could be repaired fairly quickly. It had taken about six weeks of intensive work—just completed—to get one channel going after a previous No. 5 Group attack half a mile further up. Because the target was so small, the slight error in marking which was normally considered acceptable had resulted in much reduced damage to the western channel.

"After the attack, which I had watched from a safe distance, I flew up the canal at about 100ft to try to assess the damage. The last red T.I.s were dying smokily in the watery mess. It proved to be too dark to make out details, although the main lock gates stood out fairly clearly and to my disappointment seemed still to be in position, although there was no water for them to hold back."

With the opening of the New Year (1945) many operations were cancelled because of weather conditions or snow on the runways. During January only 95 sorties were completed, but the month was not without its excitements. While attacking Royan, on the Gironde, a Lancaster collided over the target with a bomber from another unit. Despite losing six feet from its starboard wing-tip the Lancaster got back and landed safely.

In icing conditions there much trouble was experienced with the bomb aimers' panels becoming obscured, but at times the effects were even more troublesome. On the big Dresden raid on the night of February 13th nearly all the aircraft suffered in one way or another. F/O. Loveless—who had captained the Lancaster that hit the dispersed Halifax with such disastrous results—had his A.S.I. put out of action by ice while, all his engines lost power through icing of the carburettors and his Gee gave false fixes. An emergency landing was made at Melsbroek, near Brussels, which was then in Allied occupation.

Aircraft from the squadron operated, on an average, about every other day. Occasionally there were more arduous periods and at other times only training flights were made for several days. On March 14th a partially successful attack was made on Lutzkendorf, target identification being made difficult by a dense smoke screen. There was considerable enemy fighter activity, but only one Lancaster (F/O. Cranston) failed to return. Over Spilsby the weather deteriorated badly and the returning aircraft were diverted to other airfields—in most cases Downham Market. F/O. French tried to get in at Enstone, but was re-diverted to Hurn, only to find that this airfield, also, was covered with low stratus. From Hurn the pilot took his Lancaster on to the big emergency airfield at Manston. The squadron diary recounts that at Manston "the mid-upper gunner fired three rounds into the starboard inner engine, puncturing two hydraulic pipe lines and damaging the main support of the undercarriage."

No. 207 Squadron

W/C. H. N. G. Wheeler, D.S.O., O.B.E., D.F.C., Wing Commander Flying at Marham. He served with No. 207 Squadron from 1937 to 1940.

Another Lancaster on the same night was less fortunate. It crashed at Little Rissington, the present home of the C.F.S., and all its occupants were killed with the exception of the rear gunner.

On the night before the Army's crossing of the Rhine on March 24th, 1945, No. 207 were part of the force attacking Wesel, one of the crossing points.

The writer of this history, as *Flight's* war correspondent, watched the raid from close quarters on the ground. The timing was perfect and the bombing most accurate and concentrated. Each photoflash as it went off illuminated the tight cluster of smoke-puffs left by previous flashes. Incidentaliy, there had been a daylight raid on the same target earlier the same evening, when your historian, through a bit of bad map-reading, had nearly found himself in the target area. The daylight raid was by 77 aircraft of No. 3 Group and the night operation by slightly more than 200 machines belonging to No. 5 Group.

The target area was, however, so softened-up that the ground troops suffered only 30 casualties during the crossing; and it was safe for Mr. Winston Churchill to tour the area in an open car later the same day. No. 207's contribution to this attack was made with 16 Lancasters.

During the last full month of the war—April, 1945—the squadron had 215 aircraft detailed for operations, but 100 of these raids were cancelled before take-off. No aircraft were lost. Ten aircraft took off on the morning of April 25th to bomb Hitler's mountain retreat at Berchtesgaden, which was reached at approximately 0900 hr in good formation. The attack was considered by some crews a complete success, but others thought the effort somewhat scattered. Flak was bad, but no enemy fighters were seen.

This trip to the Führer's home, appropriately enough, proved to be the last operation No. 207 was called upon to do. From then on, the diary records only flights for transportation of prisoners-of-war and for purposes of training.

Almost immediately fighting had ceased the squadron began to be broken down. On June 1st, 1945, Australian personnel were posted for repatriation and the Canadians followed a week later.

Apparently No. 207 was destined for the Far East "Tiger Force," for in July it was joined by seven volunteer crews from No. 44 Squadron. V.J.-Day came before the unit could get abroad and "Tiger Force" preparations were discontinued in favour of normal training. Flying hours gradually diminished until, in April, 1946, they were down to 52 for the month.

The absolute bottom was reached in February, 1947, when flying times were down to 2 hr 48 min for the month. This, however, was due mainly to extremely bad weather conditions. The Arctic weather was eventually broken by a gale from the north-west; gusts of up to 85 kt were recorded and all the personnel were mobilized to sit in the aircraft to see that the control locks remained secure and the machines did not shift.

By this time the squadron had made two moves—first to Methwold and later to Tuddenham. It was a very dull period, the weather taking pride of place in the squadron diary and the average number of aircrews available being down to three per day. Boredom was relieved by a further move—to Stradishall, in November, 1946. By February, 1947, squadron strength was down to 15 officers, 31 other ranks aircrew and 41 groundcrew. On strength were six Lancasters.

The manning shortage was acute, necessitating the pooling of aircraft and groundcrews and aircrews on the station. It was felt that this loss of squadron identity would have a deleterious effect on the unit's *esprit de corps*. Even under the new arrangement there were rarely more than two Lancasters available.

A welcome change came in July, 1947, when the first "Sunray" was flown; for four crews this meant a detachment to Egypt for 12 days. By this time, also, the worst of the depression had passed and slowly but surely No. 207 was on the upward move again. Training became more intense, with live bombing of Heligoland. By June of the following year things had improved sufficiently for the squadron to revert to the old arrangement, with their own aircraft and servicing crews. Under this arrangement squadron spirit improved and ground staff showed more interest in their own aircraft.

The re-equipping of the squadron with Lincolns was accomplished in June, 1949. So like their predecessors, the aircraft excited scarcely any comment in the diary. The aircraft were still a mixed bag of Lancasters and Lincolns in September, 1949, when Exercise Bulldog took place—the only big Bomber Command exercise previous to this year's "Jungle King."

With the turn of the year the whole squadron—six Lincolns—left for the Canal Zone. Five made the journey non-stop and the sixth, held up with W/T. trouble, followed the next day.

Flying times for the month were over 300—for the first time for a very long while. But this was but a flash in the pan, for in February, 1950, all flying was stopped pending the closing-down of the squadron.

On May 29th, 1951, for the third time, No. 207 Squadron was re-formed. Under the present C.O., S/L. G. W. O'Neil Fisher, it was equipped with Boeing B-29As (designated Washingtons by the R.A.F.).

Security requires a veil to be drawn over most of the unit's activities during the past two years, but the squadron has taken part in all of the publicized exercises—Pinnacle, Bullseye, Kingpin,

(*Continued at foot of page 519.*)

COMMANDING OFFICERS

No. 7 R.N.A.S. Squadron, German East Africa

Sqn. Cdr. E. R. C. Nanson	April 1916

No. 7 R.N.A.S. Squadron, France

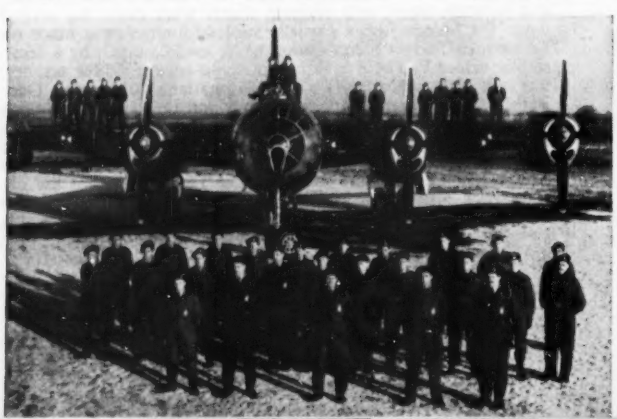
Sqn. Cdr. C. L. Courtney	Nov. 1916
Sqn. Cdr. S. W. K. Allsop	5-4-17
Sqn. Cdr. J. T. Babington, D.S.O.	27-6-17
Sqn. Cdr. H. A. Buss	1-1-18
Sqn. Cdr. H. S. Adams	20-2-18

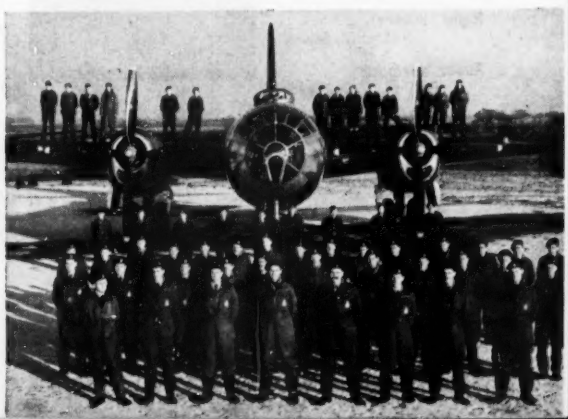
No. 207 Squadron, R.A.F.

Maj. G. L. Thompson, D.S.C.	24-5-18
Maj. T. A. Batchelor	26-7-18
Maj. G. R. Elliott	7-8-18
Maj. M. H. B. Nethersole	5-6-19
S/L. A. W. Tedder	1-2-20
S/L. V. Gaskell Blackburn, D.S.C., A.F.C.	6-8-28
S/L. J. B. Graham, M.C., D.F.C.	28-2-26
S/L. E. A. Beulah	1-12-28
S/L. J. W. Woodhouse, D.S.O., M.C.	23-4-31
S/L. J. L. Vachell, M.C.,	1-2-33
S/L. G. G. Dawson	29-9-33
S/L. P. A. Maitland, A.F.C.	9-8-34
S/L. R. J. Rodwell	6-2-35
S/L. J. W. Lissett	18-3-36
S/L. J. N. D. Anderson	6-8-38
W/C. N. C. Hyde	1-11-40
W/C. C. J. F. Kydd	8-4-41
W/C. J. N. D. Anderson, O.B.E.	30-4-41
W/C. K. P. Lewis	21-5-41
W/C. C. Fothergill	10-10-41
W/C. F. R. Jeffs	28-5-42
W/C. F. G. L. Bain	7-12-42
W/C. T. A. B. Parselle	26-12-42
W/C. P. N. Jennings	30-5-43
W/C. V. J. Wheeler	26-2-44
W/C. J. F. Grey, D.S.O., D.F.C.	23-3-44
W/C. H. R. Black, A.F.C.	16-10-44
S/L. L. McCracken	18-4-46
S/L. G. W. Vowles	18-6-46
S/L. P. J. S. Boggis, D.F.C.	17-3-47
S/L. G. J. C. Hogan, D.F.C.	9-3-48
S/L. E. J. Wicht, D.S.O., D.F.C.	10-12-49
S/L. G. W. O'Neil Fisher, O.B.E., D.F.C.	1-6-51

The present C.O., S/L. G. W. O'Neil Fisher, with his flight commanders, F/L. H. St. John Garland (left) and F/L. W. H. Adams. "Flight" photographs.

In English winter sunshine: the present squadron against a background of its American aircraft. On the left is "A" Flight, with "B" Flight on the right.





THE MILITARY INFLUENCE

—on Civil Air Transport: Sir Frederick Handley Page's Brancker Memorial Lecture

THE eleventh Brancker Memorial Lecture of the Institute of Transport was delivered in London on April 15th by Sir Frederick Handley Page, C.B.E., F.R.Ae.S., who had chosen for his subject *The Influence of Military Aviation on Civil Air Transport*. A digest follows.

Sir Frederick opened his remarks by recalling the slow growth of aviation as a whole before World War I, and the spur which the industry received during the period of hostilities. In particular, large, heavy bombers were produced—such as the H.P. 0/100 and V/1500. These aircraft had cruising speeds of the order of 80 m.p.h., and the latter type, with an all-up weight of 13½ tons, could lift a useful load of 6½ tons. When the war was over, it was natural that those who had been engaged in the manufacture of bombers should turn their minds to the development of such aircraft for civil purposes. Public opinion also favoured this aim—for a number of reasons, not all of which were well founded. It was felt that a progressive civil aviation policy would promote air-mindedness, provide a Merchant Marine of the Air, enable British manufacturers to equip foreign airlines, improve commercial communications, and even lead to better understanding between nations.

Unfortunately, it was not generally realized how much was lacking in the way of ground equipment, radio services, airfields and navigational aids. This relegated airline flying very largely to short-range, fair weather, daylight operations, and in these circumstances the impact of the new form of transport on surface methods could not be very great, even with the use of such cheap aircraft as converted bombers. Progress was very slow. It was recognized that large, multi-engined aircraft were desirable for civil use, but many years went by before it was understood that an increase in speed could mean increased revenue-miles flown without a corresponding increase in cost. Hence even in 1930 the Hannibal airliner, though remarkably comfortable and possessing admirable landing characteristics, cruised at only 100 m.p.h.

In 1931 the second monoplane era dawned, both Boeing and Martin introducing bombers of this configuration and with retractable undercarriages. Douglas revolutionized air transport with the DC-1 in 1933; thus the civil application once more followed the military lead. Great Britain, too, had advanced four-engined airliner designs on the board a few years later, but unfortunately warlike preparations caused them all to be shelved, and the years of grace thus given to America stood her in very good stead.

World War II itself, like its forerunner, once again had a great effect on the development of civil aviation: apart from the airframe and engine development associated with combat aircraft, there were the growth of military air transport, the development of radio and radar aids, the building of innumerable airfields (many, it is true, quite useless for civilian purposes), and the transformation of the gas turbine from an idea to a practical proposition. None the less, and in spite of these developments, we in Great Britain were placed at a serious disadvantage owing to the tremendous lead obtained by the Americans, who had built hundreds and even thousands of military transports during the war—aircraft which, unlike bombers, were eminently suitable for airline and small-company operation and were, moreover, available at very low prices.

Turning now to the question of production and research, Sir Frederick said that, ever since the aircraft industry became a major one during the First World War, it had depended upon military orders to keep itself going. This was still true today, and the fact had enabled civil aviation to ride along on the back of its military counterpart. Would this still hold good with the advent of supersonics and guided missiles? The lecturer thought that it would, so long as bomber and military transport aircraft continued to be built. The results of research directed at improved bomber performance—such as new wing-forms, powered controls, pressurizing systems, and so on—were all applicable to a greater or lesser degree to the modern jet airliner. It would be some time, however, before there was any question of commercial aircraft operating at supersonic speeds; and, if and when this did happen, a jump in cruising speed to 900 m.p.h. or so would be required, so that the economies arising from fast flight should be sufficiently great to offset the higher operating and first costs of supersonic aircraft.

Although development associated with bombers would benefit civil aviation indirectly, more direct advantages would accrue from the fact that the transport aircraft had become such an essential part of the equipment of modern air forces. In particular, air freighting—at present largely a military operation—was expected to expand tremendously during the next few years. The civil operators had already realized the necessity of having two types of aircraft for freight and passenger operation, and the Air Force might well have to follow suit. This could benefit all concerned, as the long-range military transport might disappear as a special type and be replaced by passenger and freight machines having both military and civil applications. Thus increased numbers of a given aircraft could be built, with consequent reduction in cost. Other types of aircraft which could well be "shared" between civil and Service operators were the short-range, easily loaded machine which could utilize small airfields—the helicopter—and the flying-boat.

The liaison between military and civil transport operations was becoming ever closer, as had been shown by the Berlin Airlift, operations in Korea, and the American Civil Reserve Air Fleet Plan (whereby the Military Air Transport Service could take over some 400 four-engined aircraft in an emergency, together if necessary with their crews). Furthermore, air-trooping—which was now carried out as far as Great Britain was concerned not only by Transport Command but also under charter by civil companies—had proved itself not only vastly quicker than its surface counterpart but, recently, actually cheaper.

Thus the idea of a Merchant Marine of the Air had at long last almost materialized. The question was, how could the great fleet of transport aircraft required be secured, and then kept up-to-date once it had been secured? A possible solution would be to establish a finance corporation for air transport which would place orders for new aircraft with the manufacturers, and would then loan them to operators on hire-purchase terms. The State would need to supply guarantees by granting long-term trooping contracts and permits to operate scheduled services and, equally, might require safeguards as to adequate operation. In the event of operators being unable to continue the hire agreement, the aircraft would be at the disposal of the Air Ministry to form part of the Transport Command fleet, so that, whatever happened, the taxpayer would not lose on the deal. The scheme would provide this country with a reserve of modern revenue-earning transport aircraft without the necessity of having to maintain at the taxpayers' expense an unduly large force of aircraft in Transport Command. This must not be thought to suggest that a Transport Command of adequate size was not required: it was still essential for the Royal Air Force to have its own transport force.

In conclusion, said Sir Frederick, the recent growth of civil aviation was such that the aircraft industry was no longer solely dependent on the military for its survival, and this was certainly a welcome sign. Civil aviation, by its close association with that of the Services, had gained many advances in the past, but it had also lost some of its flexibility and economy of operation. Now was the time to try to obtain lower landing and take-off speeds, and thus be able once again to use small, cheap airfields. There were signs that the military planners were beginning to realize this, and that, when they did so, civil aviation would once more benefit from their decisions.

The lecturer expressed his appreciation of the great help which his assistant, Mr. J. G. Roxburgh, had given him in the preparation of the paper.

No. 207 SQUADRON (Continued from page 518)

Ardent, and the more recent Jungle King, held during last March.

In common with other squadrons, No. 207 Squadron found their permitted flying hours curtailed by the oil-refinery strikes in the U.S.A. last June, but the effect was only temporary. Misfortune dogged the squadron in the 1952 Laurence Minot Trophy contest. On the first night of the competition, the Washington which represented No. 207 had an engine failure an hour after take-off. It continued on three engines but was unable to bomb the first and third targets owing to cloud, and the second because of a defective bomb-door jack. On the remaining three nights the squadron was very successful, but in the final figures showed only as eighth.

This history ends on a humanitarian note. During the floods which scourged East Anglia early this year, F/L. A. E. D. Murray took a party of airmen to assist in the evacuation and rescue of civilians marooned at King's Lynn and Hunstanton. The men gave invaluable aid, rescuing numerous people by troop transport and dinghies. In addition, from February 4th to 9th, the squadron provided 200 officers, N.C.O.s and airmen to assist in rebuilding the bank of the River Ouse at Magdalene. For his work F/L. Murray was complimented by the Chief Constable of Norfolk.

R.A.F. Responsibility for Ground-to-air Missiles

AN important statement relating to operational policy on ground-to-air guided weapons was made to the House of Commons on April 15th by Mr. Nigel Birch, Parliamentary Secretary to the Ministry of Defence.

He said that the stage had now been reached when it was apparent that such missiles had a very important part to play in the air defence of the United Kingdom. Development of these weapons was proceeding satisfactorily, and arrangements must now be studied for their future introduction and operation as part of the air defence system.

After full consideration the Government had decided that the manning and operation of ground-to-air guided weapons would become the responsibility of the Royal Air Force.

This decision was based on the fact that these guided weapons would be complementary to fighters and operate in the same air space and must therefore be under the same ground control.

Their introduction would be a gradual process. For many years to come, regular and territorial anti-aircraft regiments would continue to carry out an essential part in our air defence system.

The arrangements announced did not affect the responsibility of the Ministry of Supply for research and development.

In reply to a Member's question about the availability of the weapons, Mr. Birch said that his statement had indicated nothing about timing except that plans were being made for the introduction of guided weapons into service. The relationship between Fighter Command and A.A. Command remained exactly the same as at present, and, even after the introduction of guided weapons, for which he was not prepared to give a date, there would still be a need for anti-aircraft guns.

A similar announcement was made in the House of Lords by Earl Alexander, Minister of Defence, in opening a two-day defence debate. He also made a further important revelation; it was to the effect that work was now beginning on a fuel-pipeline system to link 140 NATO airfields. He pointed out that modern jet aircraft used "such terrific amounts of fuel" that it was almost impossible to keep them supplied in active operation by tankers alone; it was more satisfactory to pump the fuel by pipeline from one airfield to another.

Speaking of radar, the Minister said that as much of the rehabilitation of last-war stations as was necessary had been completed. He admitted that technical development of radar had not kept pace with improvements in aircraft performance; for the time being, aircraft had an advantage over this form of defence.

A subsequent speaker in the debate, Marshal of the Royal Air Force Lord Trenchard, pleaded for more long-range bombers. With the coming of the atomic bomb, he said, range had become the dominating factor. Would our new bombers, the Vulcan, Valiant and Victor, be able to carry the bombs wherever we wanted? If they could, we should not again have to fight to get airfields and carrier bases to ring the enemy.

Lord Trenchard went on to criticize the appointment of Army generals to all the higher commands. Not one British airman, he said, was a commander-in-chief anywhere; unless all concerned got the same feeling for the Royal Air Force that they had for the Navy, Britain would be an also-ran instead of being a great nation.

CORRESPONDENCE

The Editor of "Flight" does not hold himself responsible for the views expressed by correspondents in these columns; the names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

A Prévost Memory

NOBODY seems to have recalled, when Maurice Prévost died, that when he won the Gordon-Bennett Race at Reims (without an "h") in 1913 he not only "beat his own world speed record of 112.4 m.p.h." (see page 693, *Flight*, December 5th, 1952) but covered the course at a much higher speed and went on to do just over 120 miles in the hour—so that he was the first man (in fact, the first living being) to do more than two miles a minute for an hour on end. People will always forget that remarkable feat and fact.

His Deperdussin was designed by Bechereau and Koolhoven. Old man Deperdussin, who had financed Appareils Deperdussin, was in jail at the time, in connection with some alleged frauds over silk imports; and when Prévost did his 120 in the hour, the Dep. crew at Reims sent a telegram to "le bon patron" in prison—nice of them!

Koolhoven brought the Dep. over here, and with Lorenzo Santoni and John Porte (later of Felixstowe) formed the British Deperdussin Co., Ltd., which went bust with the war in 1914, though one of their machines was flown by A.Cdre. Groves, R.N.A.S., till 1918, when somebody crashed it.

The French Dep. Co. and Bechereau were taken over by Bleriot, who formed the *Société Pour Appareils Deperdussin*, the initial letters later being perpetuated in the Spad, the best French fighter. And Bleriot skilfully faded out Deperdussin's name by altering the name to the *Société Pour Aviation et ses Derives*.

John Porte, incidentally, went to the U.S.A. with Glenn Curtiss to build the Wanamaker flying-boat, which was the ancestor of all big flying-boats. He rejoined the Navy—R.N.A.S.—when war began, brought the Curtiss "America" boats to Felixstowe and produced (with Rennie) the Felixstowe boats from them, whence descend all the Short boats, Sunderlands and ultimately the Princesses. Nice chain of history, isn't it?

New Malden, Surrey. C. G. GREY.

Co-ownership Flying

AN attempt is being made, through the assistance of the Popular Flying Association, to develop an existing co-ownership flying group, or, alternatively, form a new such group, and any persons residing in the north-north-west areas of London really interested in the attempt to obtain flying at low rates might like to contact the undersigned (hon. secretary, Wycombe Flying Group), c/o 47 The Birches, Winchmore Hill, London N.21.

At present the Wycombe Flying Group, based on Denham Aerodrome, has to rely on outside hire for its aircraft, and this consequently keeps the hourly rate above that usually associated with a co-ownership group. If, however, sufficient interested persons are forthcoming it may be possible for the group, through the aid of the Popular Flying Association and the Kemsley Trust, to purchase its own aircraft and become a true co-ownership group.

Now is the time for all those persons living "north of the river" who are constantly bemoaning the fact that flying is too costly, and who complain of lack of enthusiasm, to give their support—and this applies to all past and present members of the Wycombe Group. If a sufficient number of replies are received, the P.F.A. have promised their support and help.

London N.21. R. P. MAYES.

Joint Economics

THE comparative weight figures which appear in the note on Dr. de Bruyne's talk on metal-to-metal adhesives, in your issue of March 27th, will, depending on the maturity of the reader, produce one of a number of reactions, including perhaps the too-hasty formulation of an empirical law "that an x per cent increase in empty weight would result in building an aeroplane heavier by 10 x per cent."

I am writing in the hope that such an over-generalization (which Dr. de Bruyne so rightly deprecates) may thereby be prevented from taking root. If some rather different figures are taken, more appropriate to an engine type with a lesser appetite for fuel, we might have :—

	Perdoc Mk. I	*Perdoc Mk. N.G.*
Empty weight (per cent)	45	48
Fuel weight (per cent)	30	30
Payload (lb)	28,000	28,000
Fuel load (lb)	33,600	38,100
Empty weight (lb)	50,400	61,000
Gross weight (lb)	112,000	127,100

and the corresponding too-hastily-found empirical law would involve a ratio of percentage increases less than half as big as that shown by the Comet figures.

The point is, of course, that aeroplanes exist to carry loads, and the expansion necessary to compensate for changes in the efficiency-by-weight of the equipped airframe is inversely proportional to the percentage payload.

Luton, Beds. C. F. TOMS.

[Dr. de Bruyne was referring particularly to the advantages of Redux for pure-jet airliners such as the Comet.—ED.]

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Chicago and Southern Air Lines fly DC-3 aircraft. Recently they have completed 500 consecutive days and 109,000 engine hours operation — without a single engine failure. They use **AeroShell Lubricating Oil.**

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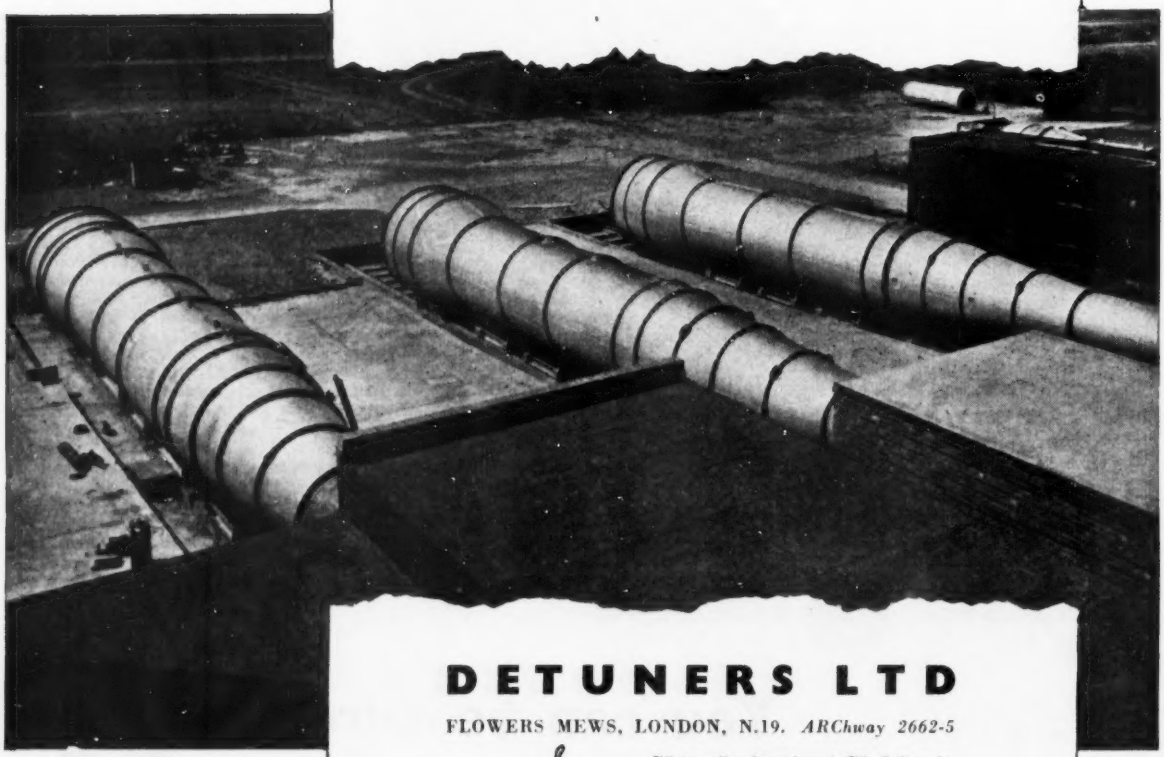

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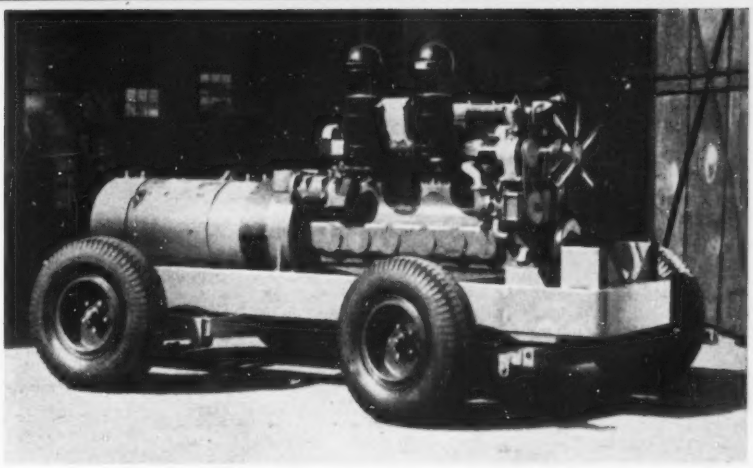
FOR GROUND STARTING

Powerful New Generator Unit



The prototype Petbow 90 kw ground starter nears completion. A cleanly designed sheet-steel casing, with recessed instrument-panel at its rear end, will be added.

THOUGH requirements for the supply of power for ground-servicing purposes have changed comparatively little in respect of the normal aircraft electrical services, the introduction of the gas turbine has brought new problems in regard to the current demanded for engine-starting. Powerful turbojets now going into service have a 112 V starter system and may make a peak demand of 600 amp, representing nearly 70 kW, and starting must be efficient and positive if the troubles attendant upon hot or wet starts are to be avoided. In military jet aircraft the cartridge-starter or the liquid-fuel type are coming into general use, but the electric starter remains the normal equipment in civil types.

It follows that a most efficient means of supplying high and sustained power from an independent unit is to make use of a power-driven d.c. generator. Petbow, Ltd., of Sandwich, Kent, who for many years have specialized in the production of mobile electric power-plants, have also turned their knowledge to the development of a range of airfield ground-starter units, and now nearing completion in their works is the prototype of what they claim to be the world's most powerful unit of this type.

In planning it, they had to determine whether the 70 kW already mentioned would meet future as well as present needs. After consultation with aero-engine manufacturers and the M.o.S., they decided that a 90 kW unit would be able to cater for any aircraft likely to be flying for many years to come, and the design proceeded accordingly.

Powering the unit is a Dorman six-cylinder diesel engine developing 160 h.p. at 1,500 r.p.m. It drives a double generator —specially designed for the purpose by Laurence, Scott and Electromotors, Ltd.—delivering both 28 V and 112 V supplies simultaneously. A continuous output of 450 amp is given for servicing or testing at either voltage, or at both. On the 112 V side a short-duration peak supply of 800 amp is available for engine starting.

It is noteworthy that the diesel engine provides enough power to generate 105 kW, thus allowing a reserve of nearly 17 per cent above the 90 kW. The purpose is to ensure that the rated figure can be maintained when the unit is operating on airfields in any part of the world, irrespective of local altitude or temperature conditions.

Several features follow standard Petbow practice in the design of mobile power-units. For example, the engine and the double generator are of robust unit construction, the "backbone" thus formed dispensing with the need for a heavy bed to preserve rigidity and alignment. The unit is supported in the chassis on eight bonded-rubber mountings, the relatively delicate electrical control-gear and instrumentation thus being insulated from vibration.

The specification incorporates full safeguards, for both the aircraft and the ground unit, against such hazards as reverse current, over- and under-voltage, and reverse polarity; and if the supply connector-plug is accidentally withdrawn while under load, the main contactor automatically breaks the circuit before the plug and socket part company, thus preventing arcing. In addition, there are independent automatic circuits which give warning of any failure in the engine lubrication or cooling systems.

The new unit will shortly be subjected to airfield trials.

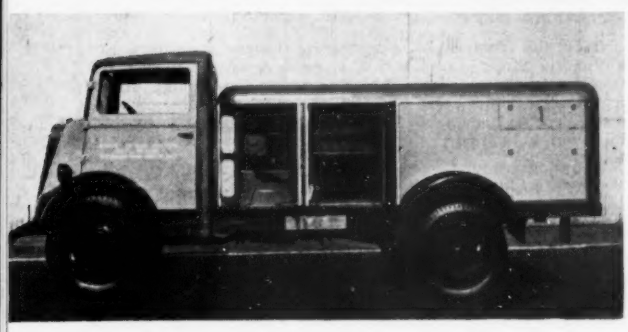
AVIATION SANITATION

COMET, Argonaut, Hermes, Constellation and Stratocruiser aircraft were used in a recent demonstration, at London Airport, of the new Mk VI toilet-servicing unit produced by the aircraft division of Air Service Training, Ltd., Hamble, Southampton.

Mounted on a Fordson chassis, the unit consists basically of a sump tank, sluice-and-charge tank, control panel, pumping equipment, and battery compartment, these components being mounted on a steel channel-section sub-frame anchored to the main chassis members of the vehicle. The assembly is totally enclosed in a metal canopy, the roof of which is easily removable to give access to the tanks.

The 245-gallon sump tank, of heavy galvanized steel, and liberally provided with 6in access holes to permit scouring of the interior, is connected to the aircraft by means of a 4in diameter flexible hose provided with an A.S.T. quick-release coupling. At the rear end of the tank-floor is a 4in drain valve, with a coupling for a disposal hose. Hoses are stowed in troughs, each of which has drainage to the appropriate tank.

The A.S.T. toilet-servicing unit, with instrument-panel and battery-compartment doors open. It is operated at London Airport by the M.C.A.



The sluice-and-change tank is divided into two compartments, one containing 100 gallons of water and the other 29 gallons of chemical solution for replenishing the aircraft closets. In this case, connection to the aircraft is by a 1in-bore rubber hose. Whereas the sewage-emptying process takes place by gravity, sluicing and charging are performed by an electrically driven pump, power for which is obtained from two 12V 100 amp hr batteries in series; there is also a manual pump for use in the event of electrical failure. A four-way valve delivers (a) sluicing water and (b) chemical solution, and also opens by-pass ports to permit both liquids remaining in the hoses to be drained back into their tanks.

Supplies of both water and solution are metered by an automatic switch in accordance with capacity requirements for any particular aircraft. There is an automatic mixer in the solution tank, and the whole process of servicing is monitored from the neat control-and-instrument panel which can be seen, in the accompanying photograph, at the forward end of the tank casing. The empty weight of the complete vehicle is 2 tons 14 cwt; laden, it is approximately 3 tons 14 cwt. The overall dimensions are: length, 17ft; width, 6ft. 3in; height, 6ft. 9in.

INSURANCE APPOINTMENTS

AT the annual general meeting of the Aviation Insurance Offices' Association Capt. A. G. Lamplugh (British Aviation Insurance Co., Ltd.) was elected chairman in succession to Mr. L. Murray Stewart (Aviation and General). Mr. Guy Thomas (Royal, Liverpool and London and Globe) was elected deputy chairman and Mr. G. Humphreys (Eagle Star) assistant secretary. Mr. G. E. Clair (London and Lancashire) continues to act as hon. secretary.

THE INDUSTRY

The Importance of Apprenticeship

THE training of apprentices in precision engineering was described by Lt.-Gen. Sir John Evetts, managing director of Rotol and British Messier, Ltd., as being "a matter of supreme importance" not only to firms but to Britain. Sir John was speaking at his company's apprentices' eleventh annual prize distribution, held recently.

Mr. A. G. Elliott, joint managing director and chief engineer of Rolls-Royce, Ltd., and a director of Rotol, Ltd., presented the prizes to the apprentices.

The presentation of prizes, said Sir John Evetts, was a culminating point in the technical training and education of boys of today who would be the skilled craftsmen of tomorrow. Without a flow of new and young blood no industry could flourish—particularly, precision-engineering firms such as Rotol and British Messier.

Four objectives of the firm's training scheme were: to train skilled craftsmen, draughtsmen and technicians as far as possible in accordance with the special aptitudes and skill of the apprentices; to co-ordinate the practical training arranged by the companies with the theoretical training offered by the technical colleges; to develop in young persons a sense of loyalty and good citizenship; and to encourage a pride in craftsmanship and technical achievement for our mutual and national advantage.

The company's apprentice scheme was entering its fifteenth operational year. At present 150 apprentices were under training and, after making allowance for completed apprenticeships this year, the number was expected to rise to 175 to 180.

Between 1941 and the end of 1952, 99 apprentices had gained the Ordinary National Certificate, while between 1943 and 1952, 74 had been awarded the Higher National Certificate.

Versatile Porvic

CONSIDERABLE improvement in the performance of aircraft batteries for a given weight is afforded by the use of Porvic separators—indestructible microporous diaphragms which, while preventing mechanical contact between the plates, allow the electrochemical reaction to proceed with maximum efficiency.

The originators of the Porvic separator are Pritchett and Gold and E.P.S. Co., Ltd., who claim to be the oldest battery-makers in Britain. Their associated company, Peto and Radford, Ltd., made batteries specially for aircraft during the first world war; they are still making them today, and Porvic separators have a share in the efficiency of the batteries employed in D.H. Comets.

Porvic has a number of applications quite apart from batteries. It is, for instance, a highly efficient filtering medium for liquids, while another specialized use for the material has been found by T.K.S. (Aircraft De-icing), Ltd., who are using a replaceable Porvic membrane in a prototype de-icing fluid distributor for wing leading-edges. The outside skin of the new distributor is formed from porous bronze sheet of high permeability. The Porvic, which is in intimate contact with the inside of this skin, offers sufficient resistance to the flow of the liquid through it to ensure even distribution over the whole surface. At the same time the Porvic prevents any solid matter, with which the fluid might have become contaminated, from choking the porous bronze. In the event of the Porvic itself becoming blocked, the distributor can be dismantled and the material replaced at low cost.

Hymatic Appointments

STAFF reorganization at the head office of the Hymatic Engineering Co., Ltd., the compressed-air-equipment specialists of Redditch, Worcs, has led to two new appointments: Mr. D. G. B. Mountford, formerly in charge of the export sales department, has become assistant production controller and Mr. D. H. V. Fereday has been appointed his successor. During the war Mr. Mountford was engaged on radar duties in the Royal Navy and became an executive officer on the staff of the C-in-C. British Pacific Fleet; he joined Hymatic in 1946. Mr. Fereday served in the R.A.F. from 1941 to 1946 as a captain of bomber aircraft in the Middle East and Italy, where he was commissioned, and was later with Transport Command, flying passengers from Britain to these areas. In 1946 he obtained a Commercial Pilot's Licence in East Africa, but upon demobilization forsook flying for industry and joined Hymatic. A founder-student of the Department of Industrial Administration at the Birmingham College of Technology, he is at present engaged in setting "case study" problems used in advanced study groups on management practice.

Mr. D. H. V. Fereday.

IN BRIEF

The English Electric Co., Ltd., announce that Viscount Caldecote, D.S.C., M.A., has been elected a director. He is a Fellow of King's College, Cambridge, and Second Bursar; Associate Member of the Institution of Naval Architects, and of the North East Coast Institution of Engineers and Ship builders; and a United Kingdom representative on the Administrative and Budgetary Committee of the General Assembly of the United Nations (1952).

* * *

A.V-M. H. N. Thornton, C.B.E., sales director of Blackburn and General Aircraft, Ltd., who has already visited India, Australia and Japan as part of his world tour, is now in the United States. It is possible that he will go on to Canada

* * *

Nearly 300 employees of James Booth and Co., Ltd., and their associated company, John Wilkes, Sons and Mapplebeck, Ltd., were recently presented with either wrist-watches or clocks in appreciation of service of 25 years or more. The presentations were made by Dr. Horace W. Clarke, managing director of both companies, at a dinner given for the purpose.

* * *

Valued at 130,000 dollars, an important contract has been secured by The North British Rubber Co., Ltd., Edinburgh, for the manufacture of aircraft tyres for the United States Air Force. During the past few years the company's tyre-building plant has been modernised in order to undertake specialized work of this kind. The contract will take twelve months to fulfil.

* * *

Mr. D. B. Cousar has been appointed aviation manager of Scottish Oils and Sheli-Mex, Ltd., and of Shell-Mex and B.P.'s Northern division; and the following have been appointed aviation managers for the Shell-Mex and B.P. divisions shown: Mr. C. E. Massey (North Western and North Eastern), Mr. G. Murray (Western), and Mr. R. T. R. Poulton (Eastern and Midland). Mr. R. G. Woodman is appointed aviation supervisor, Southern division. Mr. H. R. Gardner continues as aviation manager, London division.

* * *

Avery-Hardoll, Ltd., Tolworth, Surbiton, Surrey, announce that Mr. Desmond F. Hannan has been appointed sales manager of their industrial equipment division. He will be responsible for the sales of Avery-Hardoll fuelling equipment, including pressure refuelling couplings as now widely used in aircraft.

* * *

Elliot Equipment, Ltd., Llwnypia, Rhondda, South Wales, have published a handsomely bound and comprehensively illustrated loose-leaf catalogue—the *Numax Handbook*—of their nautical and aeronautical life-saving and safety equipment. Sections include aircraft dinghies, aircrew life-jackets and search and rescue dropping apparatus.

* * *

A booklet from G. M. Engineering (Ottery St. Mary), Ltd., 1 Victoria Street, London S.W.1, gives details of their B.B.T. (bus-bar trunking) system of electric power distribution. Affording tapping-points every two feet, the overhead ducts provide a convenient and adaptable system of bringing power to machine-tools with individual motor drives.

* * *

British Insulated Callender's Cables, Ltd., announce that they have acquired, as from April 30th, the cable and wire business of Phillips Electrical Works Ltd., Canada, and will, through a new Canadian company which they are forming with the name of "Phillips Electrical Company (1953), Ltd.," continue this business at the existing Brockville (Ontario) and Montreal factories. Mr. W. H. McFadzean will be chairman. Sales will continue for the time being through Automatic Electric (Canada), Ltd., Toronto.

NOCTURNE : Airliners of B.O.A.C.—a Stratocruiser and two Hermes IVs—figure prominently in this attractive night study from London Airport.

CIVIL AVIATION

T.W.A.'s EARNINGS

REVENUE earned by Trans World Airlines during the financial year ended December 31st, 1952, totalled £57,795,000, the highest in the company's history and 13 per cent more than in the previous year. Total expenses, including taxes, were £55,060,000, compared with £48,395,000 in 1951, and the resulting ne tincome of £2,735,000 represented an increase of only a few hundred dollars on the 1951 income. On their domestic and international routes, which now total more than 33,000 miles, T.W.A. operate a fleet of no fewer than 78 Constellations (including 10 Super-Constellations), 52 Martin 4-0-4s and 13 DC-4s. The airline's annual report notes that its 1952 passenger revenue was exceeded by only one American railroad company.

FATIGUE IN C.A.A. VIKING

EVIDENCE of metal fatigue is reported to have been found in "an essential part" of the Central African Airways Viking which crashed while flying from Nairobi to Blantyre, Nyasaland, on March 30th. The crew of five and eight passengers were killed. The Southern Rhodesian Department of Civil Aviation, which is investigating the loss of the aircraft, states that the fatigue "should not necessarily be associated with the cause of the crash." Meanwhile, Central African Airways have withdrawn from service six of their eight Vikings.

A similar step was taken late in 1951 after a fatigue fracture was discovered in the lower main spar boom of one of their Vikings; the necessary modifications were made to this and other aircraft, and the Vikings went back into service early in 1952. As a precaution, it has been B.E.A.'s practice to replace spar booms, if necessary, when Vikings have completed 8,000 hours' flying or, in any case, on completion of 10,000 hours. B.E.A.'s services, therefore, are not affected by the Vickers-Armstrongs' announcement that "As a result of a recent accident to a Viking in Africa it has been decided, as a precautionary measure, to ground other aircraft which have flown for a comparable period in similar turbulent conditions." The statement continues: "The investigation of this accident has definitely established the part which failed. Replacements are being manufactured . . . to restore the serviceability of the grounded aircraft."

AIRPORT ACTIVITY IN FEBRUARY

DUE mainly to a change in methods of reporting statistics, the M.C.A. aerodrome-movement figure for February 1953 show a decrease of nearly 11 per cent on the total movements in February 1952. Southend Airport, for example, which contributed 1,300 movements to the previous year's total for February, no longer reports traffic; and military take-offs and landings at Edinburgh, not recorded this year, numbered nearly 1,900 in February last year.

Actual air transport movements at U.K. aerodromes during the month totalled 10,430, which was 0.5 per cent more than in February 1952, and the number of passengers handled (143,000) increased by 18 per cent. The amount of freight on- and off-loaded was 3,130 short tons, an increase of 14 per cent, and the mail total decreased slightly to 1,040 tons. There were 2,470 take-offs and landings by transport aircraft at London Airport (3 per cent increase) and the number of passengers who embarked and disembarked there was 49,800, 13 per cent more than in the previous February. The number of movements at Northolt dropped by over 7 per cent to 2,360, but since the average capacity of aircraft was greater, the passenger total went up by 6 per cent to 34,300.

BIGGER AND BETTER BRITANNIAS

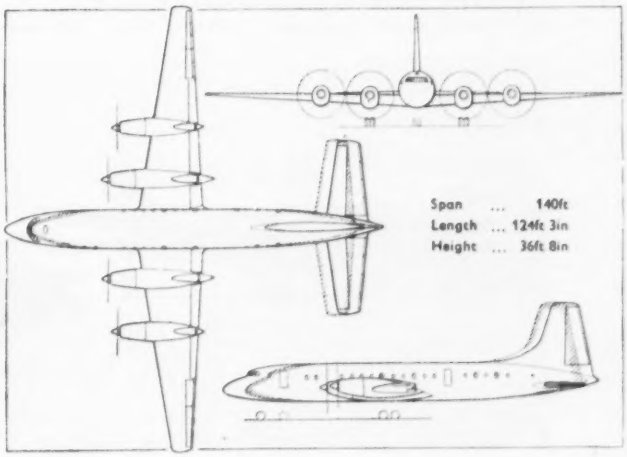
SOME details of the larger and more powerful versions of the Britannia, for delivery in 1956-57, have been announced by the Bristol Aeroplane Company. They are the Marks 200, 250 and 300—respectively freight, mixed freight and passenger, and passenger versions of an improved basic type, 10ft 3in longer than the Mk 100s now in production at Filton.

The company's continued power-plant development will make available the increased power for the new machines, which are to be fitted with Proteus 750 engines of 4,150 e.h.p. Gross weight of the aircraft will increase from 140,000 to 155,000, and payload from 25,000 to 30,000 lb. Fuel capacity remains unchanged at 6,800 gal, but the greater power and reduced fuel consumption of the new engines will enable the heavier load to be carried at a higher cruising speed and over an increased range. This, together with the higher payload/gross weight ratio, should effect a noticeable improvement in the Britannia's already low operating costs.

Typical data for the Mk 300 Britannia are as follows:—

Span	140ft
Length	124ft 3in
Height	36ft 8in
Gross weight	155,000 lb
Wing area	2,055 sq ft
Wing loading	75.5 lb/sq ft
Landing weight	125,000 lb
Weight less fuel and payload	80,420 lb
Capacity payload	30,000 lb
Fuel capacity	6,800 Imp. gal
Payload with full tanks	20,000 lb
Range with capacity payload	3,940 st.ml.
Range with full tanks plus payload	5,100 st.ml.
Max. cruise speed	389 m.p.h.
Stalling speed, sea level	96 m.p.h.
Take-off field length	5,750ft

STRETCHED : Later versions of the Britannia will be 10ft 3in longer than the aircraft now under construction. Qantas are the first airline to have placed a tentative order for the Mk 300, whose dimensions are compared with those of the Mk 100 in the drawing below.



ALL-BRITISH: The fleet operated by West African Airways Corporation on its 5,000 miles of domestic and international routes is made up entirely of British-built aircraft: nine de Havilland Doves, five Bristol 170s and—recently acquired—six Handley Page Marathons. Five of the Doves are pictured here at Lagos, the centre of the network.

CIVIL AVIATION . . .

AMERICAN AIRLINES IN 1952

IN his annual report, C. R. Smith, president of American Airlines Inc., says that the total revenues for 1952 were the highest in the history of the company, namely, £66,905,000. The airline also succeeded in increasing its profit over that of the previous year to a figure of £4,465,000.

American Airlines can claim to be, on the basis of passengers carried, the largest airline in the world, although their network does not extend outside North America and has a total length of but 10,825 miles. The secret of A.A.'s power lies in their hold over nearly all the major routes within the United States and to Toronto and Mexico, on all of which traffic is extremely heavy. The number of passengers carried in 1952 exceeded 5 million for the first time (5,094,000) and passenger mileage exceeded 2,900 million. It is worth noting that the average return per passenger-mile declined slightly during the year, principally due to the increased proportion of tourist flights. It is pointed out that some airline fares were only slightly higher than in 1940 while the remainder were substantially lower.

The company's freighters were busily engaged during the year and freight and express ton mileage amounted to 47 and 10 million respectively. About half of A.A.'s freighters are participating in the Korean air lift, the aircraft being flown by American Airlines' crews under arrangement with the U.S.A.F. At the end of 1952 the company operated 158 aircraft, consisting of 78 Convair 240s, 66 DC-6s and 14 DC-4s. (All the DC-4s are freighters except for one 65-passenger military charter aircraft.) At the present time the airline is receiving nine DC-6Bs and 3 DC-6A freighters and will shortly take delivery of the first of 25 DC-7s.

MORE SUPER CONSTELLATIONS ORDERED

PREDICTED in *Flight* several weeks ago, an order has now been placed by VARIG, a Brazilian international airline, for three compound-engined Lockheed Super Constellations. The order was announced by the manufacturers, who claimed that the major factors influencing the airline's choice were: the versatility of the L-1049C "Connie," which can provide 50 different seating combinations, ranging from a 58-seat international luxury version to a 99-seat coach-type interior; the operating cost per ton-kilometre on either long or medium routes, "lower than any other aircraft known at present"; and the prospect of eventual conversion to turboprop power.

Including spares, the order is worth $7 m (£2½ m) to Lockheeds, who already have orders totalling £44 m for Super Constellations not yet delivered. VARIG will receive its new aircraft early in 1955.

It is also confirmed that Qantas Empire Airways have increased their order for three Super Constellations (also compound-engined) to one for seven of these aircraft.

BELGIAN HELICOPTER ROUTES

SABENA, the Belgian airline, recently announced its intention to inaugurate Europe's first international helicopter services, using seven-seat Sikorsky S-55s. Starting dates for the services are not known, but it is hoped to begin them before the end of the year. It is now announced that there will, initially, be three separate routes: to Liége and Cologne; to Antwerp and Rotterdam; and to Luxembourg and the Saar. Brussels will, of course, be the focal point.

AIR-SURVEY VARIETY

A LIST of contracts undertaken in 1952 by Hunting Aerosurveys, Ltd., emphasizes the growing importance of air photography as an aid to modern industrial and urban development. Tasks completed are grouped under the following headings: town-planning; reservoir-planning; railway development; agricultural surveys; industrial development; power-line surveys; and models. In addition, details are given of surveys completed in no fewer than 15 countries abroad, many of them in the Commonwealth.

These extracts give some idea of the variety of tasks undertaken by the firm:— Air survey of 277 acres, plans at 1:500 with 5ft contours (Pontypool U.D.C.); plans of 42 miles of track at 1:1,584 scale (British Railways, Western Region); survey of 650 acres, mosaic at 1:2,500 scale (New Frome Quarry Co.); Perspex model of the "High Paddington" project at 1:384 scale (for author and architect Sergei Kadleigh).

In Thailand, Hunting Aerosurveys undertook the training of local personnel while carrying out a photographic survey of over 15,000 sq km for development purposes; and maps covering a further 3,750 sq km were produced for an irrigation survey. Other examples of the company's overseas work included surveys for dam sites in Iraq, for oil in East Africa and for minerals in Rhodesia. Photographs of aircraft equipment used for oil-prospecting appear on page 507 of this issue.

WORLD NAVIGATORS' CONFERENCE

THE fourth convention of the International Airline Navigators Council, held in Montreal March 25th-27th, provided an opportunity for the navigators of 29 of the world's major airlines to exchange technical information. A member of this growing organization contributes the following report of the meeting.

In his opening remarks to the delegates, the chairman, Mr. John Nicholas (T.W.A.), noted that since its modest beginning four years ago the I.A.N.C. had grown consistently; it now represented approximately 85 per cent. of the world's active airline navigators. Thirteen nationalities and 29 different airlines were included in the membership list. Mr. Nicholas said that, despite lack of airline passes, it was gratifying to be able to welcome delegates from points as far distant as the Philippines, Switzerland and Spain. The navigators had worked their way on commercial flights to points as close as possible to Montreal and had paid their own fares for the balance of the routes.

The Council now seeks recognition by I.C.A.O. as the official

B.K.S. TO THE RESCUE: An interlude at Bahrein, Persian Gulf. The Skymaster (left), operated by the French company T.A.I., is being fitted with a replacement P. and W. R-2000 after "landing on three." The new engine was flown from Orly by a Dakota (right) of B.K.S. Aerocharter, Ltd.

The S.E.P. 2 takes over the BRITANNIA

Pilot's Controller

The S.E.P.2 Automatic Pilot combines all the advantages of its famous predecessor, the S.E.P.1, with extra refinements to meet the exacting needs of modern high speed aircraft. The S.E.P.2 has already proved itself under test conditions, and has been adopted for the Bristol "Britannia" and the De Havilland "Comet 2".

- *The S.E.P.2 has a height lock control, enabling the aircraft to be held automatically at a constant barometric height.*
- *An Automatic Approach Coupling is incorporated for linking the S.E.P.2 to the instrument landing system.*
- *The quick reaction of the S.E.P.2 circuit to flight deviations makes it suitable for modern fast airliners.*
- *The S.E.P.2 is 40 lbs. lighter than the S.E.P.1, representing a saving of weight of 25%.*

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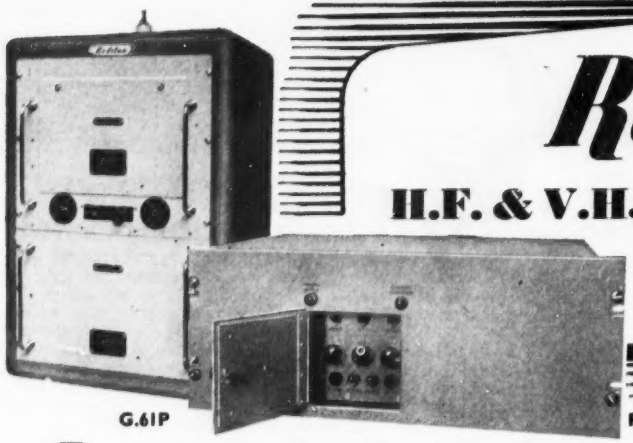

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The Redifon G.61P 50 watt Transmitter provides a 5 spot frequency H.F. R.T. service in the 2.5-10 Mc/s band.

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These four equipments are widely used for ground to air services in many parts of the world.

R.72 G.71

Aviation Communications Division.

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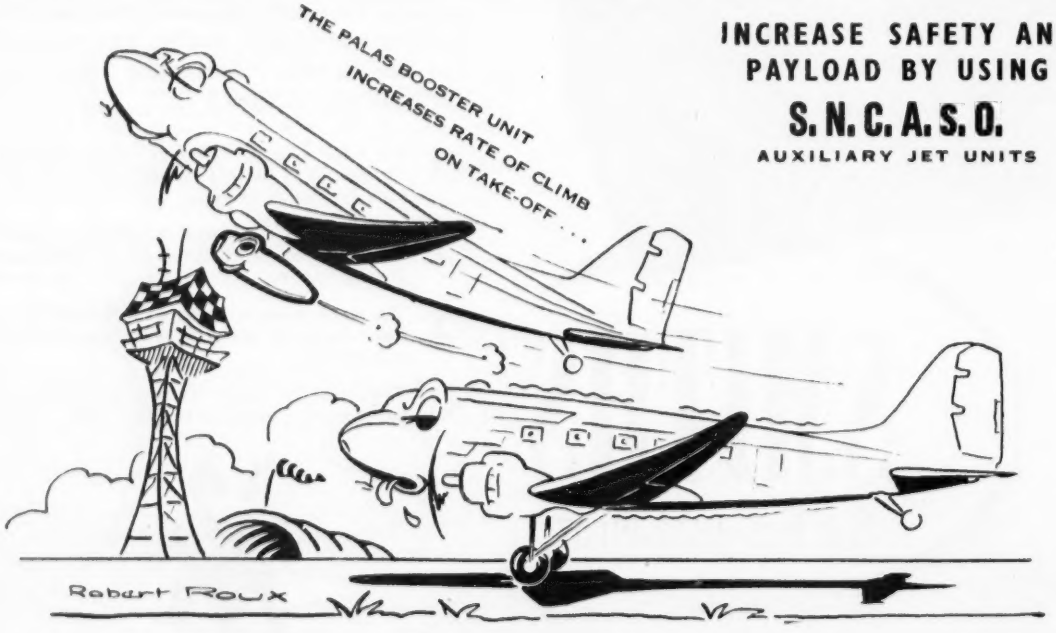

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CIVIL AVIATION . . .

representative of its member associations. Such recognition would permit I.A.N.C. members to attend certain I.C.A.O. meetings and to make recommendations concerning practical navigation procedures, weather reporting practices and allied topics. It is felt that these recommendations, already standardized by the I.A.N.C., would greatly assist the work of I.C.A.O. Delegates were advised that the application for recognition has been tabled for consideration at the next session of the I.C.A.O. council in late April.

During the convention considerable discussion took place on pressure-pattern navigation techniques, and comparisons were made of the different systems in use by the airlines represented. Great advances have been made in recent years in this field—advances which have already been reflected in analyses of trans-ocean flight times. It is hoped that the sharing of knowledge will result in considerable savings of money for the airlines and of time for the passengers, who will benefit from shorter flights over better "weather" routes.

M. Henri Almin (Air France) was elected chairman of the International Airline Navigators Council for the next year, Mr. F. Wirth (Swissair) was re-elected secretary and Mr. W. Henderson (T.C.A.) was elected vice-chairman.

The conference was rounded off by a tour of the Canadair, Ltd., factory in Montreal.

BREVITIES

STATISTICS for the Corporation's financial year 1952/53, which ended on March 31st, show that B.E.A. carried 23 per cent more passengers and 13 per cent more freight than in the previous 12-month period. The approximate passenger and freight totals for 1952/53 were 1,400,000 and 14,100, compared with 1,136,000 and 12,500.

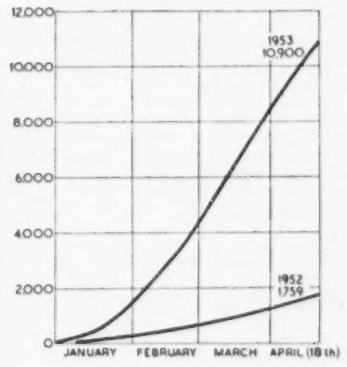
* * *

The following amendments to British Civil Airworthiness Requirements have been issued by the Air Registration Board: Contents List, issue 20; General Foreword, issue 16; and Section "R" (radio), issue 2.

* * *

The Skyways and Lancashire Aircraft group of companies estimate that their Yorks will have carried between 20,000 and 30,000 people on the Cyprus-Fayid route when "Air Trooping Task 18" ends on October 31st. This scheme, which began on April 15th, is designed to provide travel for Service personnel and Service-sponsored civilians in the Canal Zone who wish to spend their leave periods of two to three weeks in Cyprus. The group will establish a maintenance base at Nicosia.

* * *



BOOKINGS BOOM: The remarkable increase in bookings experienced by Silver City Airways since the beginning of this year is attributable largely to fare-reductions for both vehicles and passengers travelling on the cross-Channel ferry services. Shown here are the cumulative totals of "vehicle units" booked (one of these units represents a car, four motor cycles or eight pedal cycles).

* * *

Hunting Air Transport have announced that, subject to completion of the necessary formalities, their domestic and international services will be inaugurated in the following sequence: first half of May, London-Newcastle and routes between Newcastle and Glasgow, Manchester, Paris and Amsterdam; second half of May, Newcastle-Luxemburg-Basle and Newcastle-Oslo-Stockholm; early June, Newcastle-Hamburg-Copenhagen and extension of Amsterdam service to Dusseldorf. Low fares, based on the standard I.A.T.A. tourist rates, will be charged in each case.

* * *

Last week two European airlines announced new services due to begin next month: Swissair will open a weekly Zurich-Vienna-Zurich service on May 3rd, and five days later S.A.S. will inaugurate the "Night Spaniard" weekly return flight on the Stockholm-Copenhagen-Barcelona route, using DC-6s.

C. OF A. FOR THE ARIES

THE Miles Aries, a more powerful development of the Gemini, has recently received its normal-category C. of A., and the first aircraft has been delivered to its purchaser, the Hon. M. A. R. Cayzer. Unfortunately, due to the large capital investment required, and to the high-priority work being performed by the firm in connection with other aircraft, no further production of this machine will be carried out by the designers, F. G. Miles, Ltd., of Shoreham. An Italian aircraft firm is interested in manufacture under licence, however, should there appear to be a reasonable market for the type.

From a preliminary estimate of Italian production costs, a probable selling price appears to be just over £9,000. For sale in Britain, the aircraft would be subject to 20 per cent import duty, less the export value of components, such as engines and airscrews, manufactured in the U.K., which might amount to some £2,000.

A development comparable with that of the Aries from the Gemini was that of the Monarch from the Whitney Straight, which took place in 1938, and which required £2,000 for the design and construction—and three days to obtain the C. of A. For the first Aries, the cost has been some £14,000 and the time taken to obtain the C. of A., under present A.R.B. requirements, just under a year.

The main differences from the Gemini lie in the greater power of the engines—installed in newly designed engine bearers and nacelles—coupled with an increase in the all-up weight. The aircraft has been strengthened to meet the improved performance, and redesigned tail surfaces give increased stability and improved characteristics for single-engine operation. Seating accommodation (for four people) is the same as that of the Gemini, but greater attention has been paid to passenger comfort and to sound-proofing, and an additional luggage locker with an external hatch has been fitted behind the rear seats.

The power units are two Cirrus Major III engines of 155 h.p. each, driving Fairey-Reed fixed-pitch metal airscrews. The engine bearers are of cantilever beam type, and the engine cowlings are of hinged car-bonnet pattern. The fuel capacity is 66 gallons, carried in crash-resistant bag-type tanks, and improved fuel gauges are fitted. The instruments satisfy I.C.A.O. requirements for I.F.R. navigation; radio can be installed at extra cost if required.

Typical performance figures are quoted as follows:—

Tare weight	2,350 lb
Maximum a.u.w.	3,475 lb
Mean weight for performance data	3,200 lb
Maximum level speed (1,000ft)	172 m.p.h.
Maximum cont. cruise (1,000ft)	150 m.p.h.
Maximum rate of climb (s.l.)	1,300ft/min
Maximum rate of climb (5,000ft)	950ft/min
Maximum rate of climb (10,000ft)	625ft/min
Climb on one engine	180ft/min
Service ceiling	20,000ft
Run to unstick	230 yd
Distance to 50ft	425 yd
Landing run	180 yd
Maximum still-air range (with 65 gal. at 135 m.p.h.)	675 miles

SUPER GEMINI: Ian Forbes is at the controls of the Cirrus Major-powered Miles Aries in this new air-to-air view.

SERVICE AVIATION

Royal Air Force and Naval Aviation News

SHAPE Appointment

THE new SHAPE Deputy Chief of Staff (Plans and Operations) is to be A.V-M. W. L. Dawson, D.S.O., who will succeed A.V-M. E. C. Hudleston.

A.V-M Dawson has been Assistant Chief of the Air Staff (Policy) for the past 15 months and prior to that was an instructor at the Imperial Defence College. For his new appointment, which he will take up on August 1st, he will assume the acting rank of air marshal.

R.P.A.F. Assistant C.A.S.

UNTIL recently Chief Technical Officer, Engineering Division, R.A.F. Technical College, G/C. W. R. Worstall, O.B.E., A.F.R.Ae.S., has been seconded to the Royal Pakistan Air Force as Assistant Chief of Staff (Supply and Technical Services). For his new appointment G/C. Worstall will assume the acting rank of air commodore.

Coastal Command Goodwill Flights

TRAINING and goodwill flights to Ceylon and South Africa by six Avro Shackletons of No. 42 Squadron, Coastal Command, are at present under way. The aircraft left St. Eval on April 12th and are due back on May 6th. G/C. D. M. Somerville, Officer Commanding St. Eval, is commanding the flight and the C.O. of No. 42 Squadron is S/L. D. H. Sutton.

The programme allows for the squadron to take part in exercises arranged by the C-in-C. East Indies and the A.O.C. Ceylon before dividing—three Mk 1 Shackletons returning to St. Eval from Ceylon and three Mk 2 Shackletons going on to South Africa. The first leg of the course to Cape Town entails a 2,450-mile flight to Mauritius. The itinerary in South Africa and home is: Johannesburg, Cape Town, Leopoldville, Kano, Idris and St. Eval. At the conclusion of the flight the aircraft returning from Ceylon will have flown 12,815 miles and the Mk 2 Shackletons 17,740 miles.

R.N.V.R. Summer Training

THIS year, for the summer training programme for the R.N.V.R. air squadrons, emphasis is being placed on armament and anti-submarine work.

Anti-submarine squadrons equipped with Firefly aircraft will be flying to Northern Ireland for periods of training at R.N. Air Station Eglinton, Co. Derry. Units of the Channel Air Division R.N.V.R. based at R.N. Air Station Ford, Sussex, will go in two parties, from May 16th to 30th and August 22nd to September 6th, and No. 1841 Squadron (from Stretton, Lancs) from June 20th to July 4th.

For weapon training and operational exercises No. 1831 Squadron from Stretton will be going to St. Merryn, Cornwall, from June 20th to July 4th, while Southern Air Division squadrons from Culham, Berks, will visit Culdrose, Cornwall from July 4th to 18th. The Midland unit, No. 1833, stationed at Bramcote, Warwickshire, will be at St. Merryn from July 11th to 25th.

The only R.N.V.R. squadron to spend its entire summer training period at sea this year will be No. 1830, the Scots-manned unit based at R.N. Air Station Abbotsinch; it will be embarked in a carrier during July for deck landing training and exercises. In addition, it is expected that No. 1831 Squadron will spend the week-ends May 29th to June 1st and June 5th to 8th at sea.

R.A.F G.S.A.

UNTIL recently in charge of the 2nd T.A.F. Gliding Centre at Scharfoldendorf, Germany, F/L. R. E. Osland has now become general secretary of the Royal Air Force Gliding and Soaring Association. His address is R.A.F. Station, Cardington, Bedfordshire.

R.N.Z.A.F. Appointments

THE New Zealand Air Board has announced the appointment of G/C. C. C. Hunter as Director of Technical Services in succession to G/C. G. H. Procter, who has been on loan from the R.A.F. since early in 1950 and who has now returned to Britain.

A second appointment is that of G/C. A. H. Marsh, M.B., Ch.B., D.T.M., and H. (Eng.), Director of Medical Services, R.N.Z.A.F., to be Honorary Physician to the Queen.

W/C. D. J. H. Lay, D.S.O., D.F.C., who is on loan from the R.A.F., has arrived in New Zealand to take up his appointment as Officer Commanding the Officers' School at R.N.Z.A.F. Station Whenuapai.

NATO Canadian Appointment

IT has been announced that A. Cdre. W. R. MacBrien, O.B.E., C.D., R.C.A.F., Chief Staff Officer at Air Defence Command H.Q., St. Hubert, is going to No. 4 A.T.A.F. at Lansberg, Germany, in a similar capacity.

A. Cdre. MacBrien, who is British-born, has served in the Royal Canadian Air Force since 1935. During the war he commanded a Canadian fighter sector on the Continent.

The First Air V.C.

IN our report last week, concerning the winning of the Mason Memorial Trophy by No. 6 Squadron, reference was made to Lt. Walker, a squadron pilot, winning the first V.C. for air combat. This should, of course, have read "Lt. Hawker."

R.C.A.F. Exchange

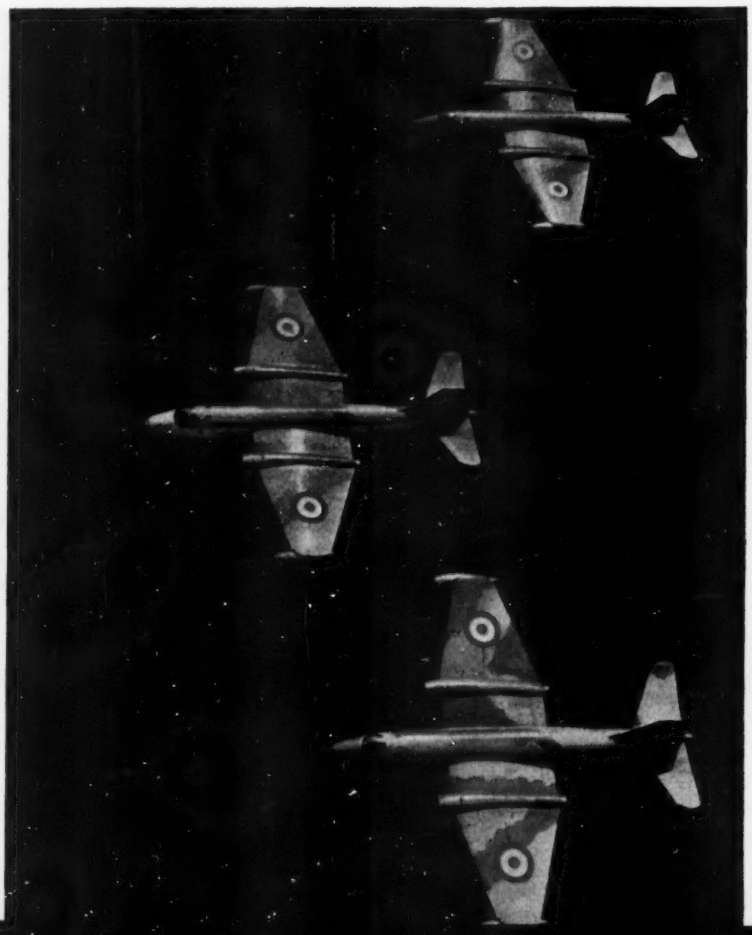
A RECENT appointment under the officer exchange scheme is that of S/L. J. MacKay, D.F.C., R.C.A.F., who has been transferred to Korea for a six-month tour of duty with the U.S.A.F.

S/L. MacKay recently took a course at the R.A.F. Flying College, Manby, Lincolnshire, and at the time of his appointment was commanding No. 416 Squadron, R.C.A.F., at Grostenquin in France.

Reunion

THE eighth annual reunion of Bomber Command H.Q. Officers' Association is being held at Bomber Command Headquarters, R.A.F. High Wycombe, Bucks, on Saturday, May 16th. Any member of the association who has not yet received details of the function should apply to the secretary of the Association at the above address.

EAST ANGLIAN TRINITY: A very striking picture of three Canberras of No. 101 Squadron, R.A.F., performing some very low-down formation flying for "Flight's" camera.



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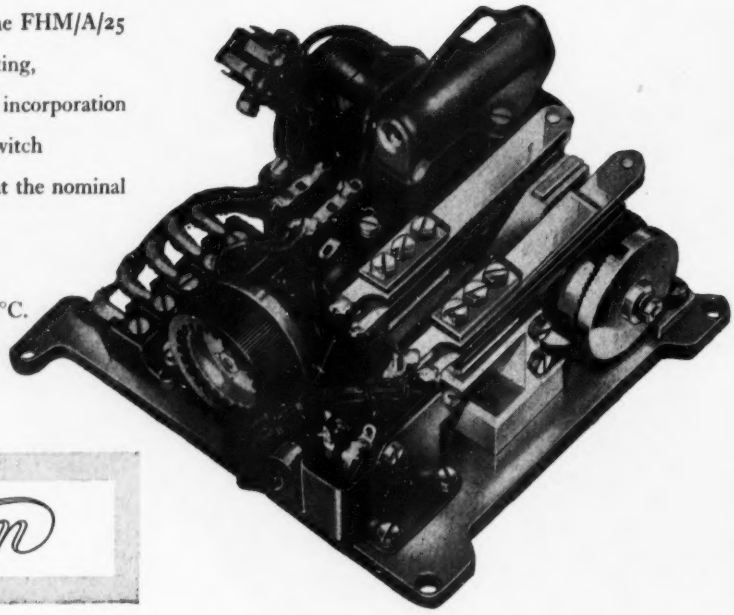

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"Flight" photographs

CRANWELL PARADE: (Top left) The cadet wing in close column at the end of the slow march-past. The Colour can be discerned in the centre. (Top right) A general view of the parade in front of the main entrance to the College. (Lower left) Prizewinners: Sen. F/Cdt. G. S. Turner (Fellowes Memorial), Sen. F/Cdt. P. J. Goodall (R.U.S.I. Award and Air Min. Imperial and War Studies Prize), F/Cdt. U.Off. J. D. Leary (Sassoon Memorial), F/Cdt. U.Off. P. L. Gray (Sword of Honour and Chance Memorial), F/Cdt. Sgt. R. J. Roberts (Queen's Medal), F/Cdt. U.Off. W. J. Hodgkinson (Medal of Honour), F/Cdt. Sgt. W. Topping (Groves Memorial). (Right) Air Chief Marshal Sir Hugh P. Lloyd presents the Sword of Honour to F/Cdt. U.Off. Gray.

SERVICE AVIATION . . .

EMPHASIS ON FLYING—BY SIR HUGH P. LLOYD

A BITTERLY cold north-east wind accompanied by rain and hail marred the passing-out parade at the R.A.F. College, Cranwell, on Tuesday of last week. Despite the uncomfortable conditions, however, the parade was quite up to (and perhaps even better than) the usual high standard. The Entries passing-out were No. 58 Entry (General Duties) and No. 9 Entry (Equipment and Secretarial).

The reviewing officer was Air Chief Marshal Sir Hugh P. Lloyd, K.C.B., K.B.E., M.C., D.F.C., LL.D., and for him personally the occasion was also in the nature of a passing-out parade: only the previous Wednesday he had given up his post as A.O.C.-in-C. Bomber Command, and retired from the Royal Air Force.

In his speech to the cadets he stressed the importance of taking every opportunity to fly—or making opportunities if they did not occur of themselves. Putting emphasis on the word "flying," he said: "Behind every pilot in our Service there are 400 people on the ground and all of them have but one object in view—flying.

"I want to place emphasis on that word because nowadays we live so close to aeroplanes that we may well tend to overlook the vital importance of flying."

The cadets of the E. and S. Branches he also adjured to fly, asking them "to take as much pride in a flying task well done as the aircrew themselves. . . . I say that because you will never do your job as well as you should unless you fly. . . . In the air you will share some of the discomforts and hazards of your colleagues as well as the achievement and exhilaration and intense satisfaction of flying."

He then stressed four points. "My first," he said, "is that all good airmen are enthusiasts. They tackle their flying with determination. zest and energy. They have an urge to fly and flying is a pleasure. Do remember that when flying ceases to be a pleasure, the urge to fly has gone also. Once that urge has gone, and regardless of experience and rank and appointment at the time, a very important quality as an airman has gone with it and thereafter we are only of limited use to the R.A.F. I must emphasise that by flying I mean as captain of the aircraft."

Sir Hugh then spoke of the importance of keeping up flying—a subject of which he is an authority, since he flew regularly up to the time of his retirement. "At one time," he said, "staff officers were supposed to fly in any obsolescent aircraft so that we could put all our latest aircraft into squadrons and so boost our front-line strength. This was a very dangerous practice. Airmen are needed just as much on staffs as in squadrons, and with the advent of the jet engine this is most important. In fact, orders to jet squadrons written by a staff officer who is ignorant of jet flying might just as well be written in Chinese. A piston-engine pilot today is as much out of date as an archer from Agincourt. And when you find yourselves on a ground job such as the staff, go to your stations by air or you will lose caste. Indeed, the only way to a station is straight down the centre line of the runway—and the worse the weather the better."

Sir Hugh's third point stressed the high cost of jet flying, quoting as an example the Canberra burning 400 gallons an hour. Finally he pointed out that the "wild young man" pilot of years ago was now of little use. "Today," he said, "our flying demands not only courage, but skill, accuracy and concentration of the highest order. When you go out into the Service your jobs will be varied; it may be to drop a bomb, fire a gun or take photographs; but whatever it is we must bring to it enthusiasm, skill and a determination to be meticulously accurate in all we do."

SCIENTIFIC AND ELECTRONIC

Two London Exhibitions of Modern Instruments and Components

ALTHOUGH not primarily of aeronautical interest, two exhibitions which took place last week in London and which were visited by *Flight*, did attract both exhibitors and visitors from the aircraft industry. The two shows were the 37th Exhibition of Scientific Instruments and Apparatus, organized by the Physical Society; and the 10th British Radio Components Show of the Radio and Electronic Components Manufacturers' Federation.

The Physical Society exhibition was held at Imperial College, South Kensington, from April 13th-17th, and was opened on the Monday morning by Professor R. Whiddington, C.B.E., M.A., D.Sc., F.R.S., president of the Society. There were 134 exhibitors, including six university departments and 17 Government establishments, and among the latter was the Royal Aircraft Establishment.

In the R.A.E. display—one of several staged by the M.o.S.—were a pyroheliometer for use in aircraft, and a strain-gauge balance for wind-tunnel measurements. The former has been designed to measure the solar radiation reaching an aircraft in flight, so that the heat balance in the aircraft can be calculated and information obtained concerning cabin-heating problems. The wind-tunnel balance is of four-component type and employs a Wheatstone bridge, consisting of four strain-gauges, associated with each component. The strain-gauges are cemented to the model support and the magnitude of the component is measured by the change of ratio of the arms required to balance the bridge, servo-operated potentiometers having been developed for quick and accurate balancing.

The problem of making wind-tunnel measurements of steady forces when low frequency pulsations in the airflow are possibly present has been solved by the use of a novel type of discriminator utilizing rectifier bridges, which can isolate the effect of such steady loads, even when the low-frequency oscillatory loads are many times greater.

Another M.o.S. stand was that of the Aeronautical Inspection Directorate Test House, Harefield. Among the measuring instruments shown here was apparatus for the inspection of turbine- and compressor-blade contours, consisting basically of a pantograph carrying a special measuring stylus on one side of the frame and a plain stylus on the other; these follow, respectively, the contours of the test-piece and a master block. Movement caused by differences in section can be registered by a dial indicator, an automatic graphical recorder or a reject/accept light system, and the adjustable platform enables the horizontal section of the blade at any vertical position to be studied.

Measuring equipment was exhibited by two aircraft firms Boulton Paul Aircraft and Saunders-Roe (Electronics Division). Among the Boulton Paul instruments shown was a new differential manometer, to be fitted to the low-speed tunnel at the College of Aeronautics, and which is being developed for wind-tunnel control purposes. In addition to the foil strain-gauges shown by the Saunders-Roe company, a direct-reading phase meter was on view: this had been originally designed to be used in the measurement of torque in shafts, in connection with the company's helicopter programme.

Elliott Brothers (London) Ltd., included in their display a three-channel self-balancing strain bridge, produced for use with wind-tunnels at R.A.E., Farnborough, and N.A.E., Bedford; other strain indicators; and examples of "Elliottronic" printed and potted circuit units, as used in guided weapons and analogue and digital computors. From the representative on the Venner stand, where the well-known lightweight silver-zinc auxiliary accumulators were on view, we learned that a main aircraft battery of this same type was also under development.

Included in the products of Kelvin and Hughes (Aviation) Ltd. were a small altitude-operated switch, a stall-warning indicator, miniature slip-rings and brushes, and the power- and instrument-failure indicator used on the company's turn-and-slip gyro instrument.

* * *

The R.E.C.M.F. exhibition of radio and electronic components and test gear was held at Grosvenor House, Park Lane, and was opened on Tuesday, April 14th, by Sir Robert Renwick, Bart., president of the Federation. Firms and establishments represented numbered 120, and many overseas visitors were present. By far the majority of exhibiting firms manufacture some item used in aircraft applications of electronics, and it would be pointless merely to list these companies, especially as their displays on this occasion were not specifically aeronautical. But the more important trends and the major exhibits of aeronautical relevance may briefly be described.

The need to "add more lightness" and save space in all airborne electric, radio and radar equipment has long been recognized, and the trend towards smaller components is no new one. But the degree to which this has been successfully done was well illustrated in this year's exhibition. The Radio Components Research and Development Committee of the Ministry of Supply showed various developments in printed and potted circuits, including one assembly of 38 components and four valves in the space of two cubic inches, a complete guided-missile receiver, and a selection of sub-miniature components. Printed and potted circuits were shown also by A. H. Hunt (Capacitors) Ltd., Erie Resistor Ltd., the Plessey Company, and Bakelite Ltd., and among the sub-miniature components was a volume control made by Egen Electric, Ltd., for use in radiosonde and guided-missile equipment.

Cathode-ray tubes for airborne and ground radar equipment were shown by all the major valve manufacturers, and included in the display by Thermo-Plastics, Ltd., were a Durestos wing-tip, fibreglass radomes, and ducting used on the Hawker Hunter. Among the exhibits of Murex, Ltd., were tungsten, tantalum and zirconium products; a new aluminium-based lightweight rectifier for aircraft power supplies was shown by the Westinghouse Brake and Signal Co. Ltd.; and the Mycalex Company displayed a new moulding, able to withstand temperatures up to 400 deg C, for jet-engine applications.

NEWS FROM JAPAN

A REPORT recently received from Tokyo gives somewhat conflicting details of the present and prospective capacity of the Japanese aircraft industry. An investigation by the Civil Aeronautical Industry Section of the Ministry of International Trade and Industry has produced an estimate of the total present production capacity of 46 aircraft, 30 engines, and 100 airscrews per month. This compares with an optimistic unofficial estimate from figures given by the ten leading firms themselves of a potential capacity for 850 light aircraft and 1,420 engines.

To pay for the more realistic programme mentioned by the Ministry, its report estimates that over 2,073 million yen (approximately £2,060,000) for equipment and 1,453 million yen (£1,443,000) for operating costs is required. The main manufacturers are: Fuji Industries, Shin Mitsubishi Heavy Industry, Kawasaki Gifu Works, Kawasaki Machine Industry, Shin Meiwa (Kawanishi), Shin Aichi Industry, Okamura Seisakusho, Tokyo Ga-Electric Industry, Tsukushi Industry (Kyushu Aircraft), and Toyo Aircraft—few of whom are able to provide the necessary capital. With government support, a maximum monthly rate at full production would be about 300 single- or twin-engined aircraft and some 500 engines. The probable demand for aircraft, however, seems unlikely to exceed 150 per month.

Since the war, the enforced inactivity of the Japanese aircraft industry has caused any expansion now to be a long and difficult job—especially so in view of the marked advances in post-war turbojets. Several repair contracts, however, have been negotiated. Amongst these is one for the Shin Mitsubishi Heavy Industry, who are to repair B-26, C-46 and C-119 aircraft for the U.S. Far East Air Force. The extent of the initial contract is for $700,000 (£246,000), and the work will be carried out at Komaki. Another has been gained by Kawasaki, who are repairing F-51 fighters as well as tooling up to manufacture Bell helicopters.

It seems probable that the future development of the industry will feature a smaller number of large firms; a number of mergers of the smaller firms have already been reported. In addition, contracts with foreign firms are being signed, such as those of Shin Mitsubishi with North West Airlines and Pratt and Whitney, Kawasaki with the Bell Aircraft Corporation, and Toyo Aircraft with Fletcher Aircraft. Many firms, however, are facing the dilemma that such agreements are expensive, but without them break-even production is unlikely. In order to facilitate co-operation between the various manufacturers, the Association of Aircraft Industry was founded, on March 10th.

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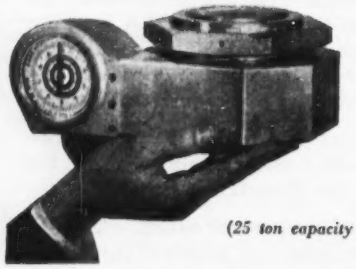

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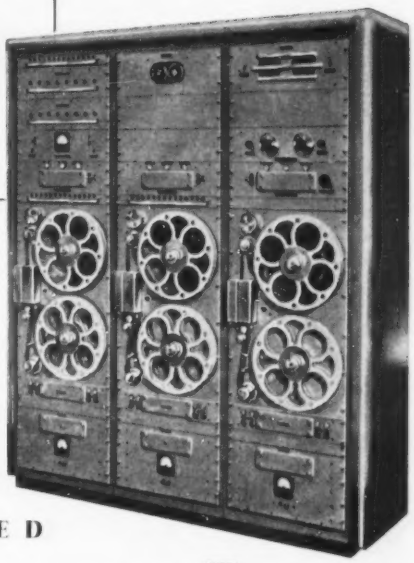

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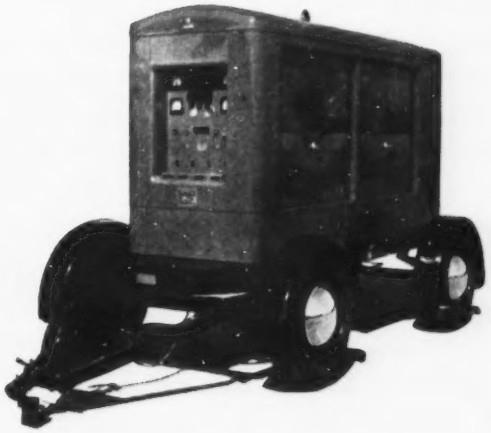

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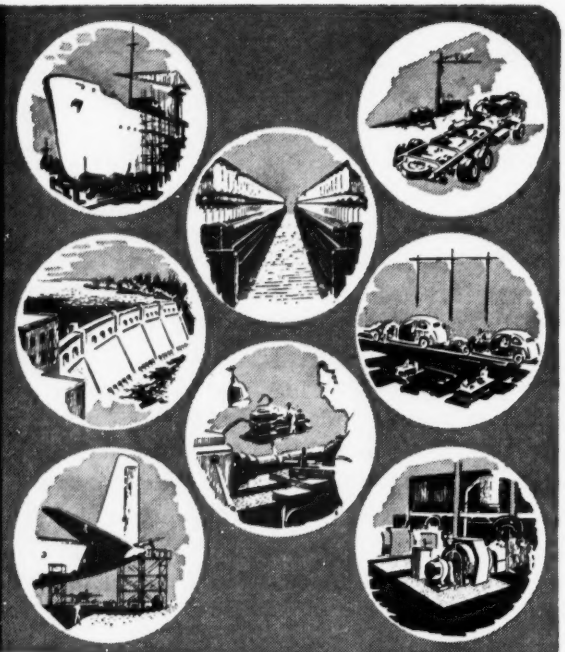

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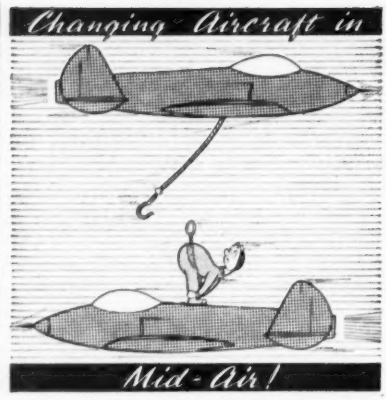

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PUBLIC ANNOUNCEMENTS

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THE Air Transport Advisory Council give notice that they have received the undermentioned application to operate a scheduled air service:—

APPLICATION No. 189, from Airwork, Ltd., of 15 Chesterfield Street, London, W.1, for a normal scheduled service initially with Hermes aircraft and later with Bristol Britannia aircraft for the carriage of passengers, supplementary freight and mail between London Airport and Khartoum, with intermediate traffic stops at Paris, Rome, Athens (on demand optional) and Cairo, at a frequency of from four to seven services weekly during a 10-year period commencing two months after the date of approval.

THIS application will be considered by the Council under the terms of reference issued to them by the Minister of Civil Aviation on 30th July, 1952. Any representations or objections with regard to this application must be made in writing, stating the reasons, and must reach the Council within 14 days of the date of this advertisement, addressed to the Secretary, Air Transport Advisory Council, 9 Buckingham Gate, London, S.W.1, from whom further details of the application may be obtained. When an objection is made to an application by another air transport company on the grounds that they are applying to operate the route or part of route in question, their application, if not already submitted to the Council, must reach them within the period allowed for the making of representations or objections. [9540

THE College of Aeronautics. English Electric Research Fellowship in Aeronautics. Applications are invited for a research fellowship which has been established at the College by the English Electric Co., Ltd. The fellowship is intended to provide opportunity for post-graduate research into problems of vibration or stability and control of aircraft, and is tenable for one year beginning on or about October 1st, 1953. The value of the fellowship is £500.—Applications, giving full particulars of education and experience, and quoting the names of three referees, are required by May 1st, 1953, and should be addressed to the Warden, The College of Aeronautics, Cranfield, Bletchley, Bucks. [9508

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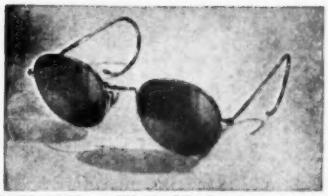

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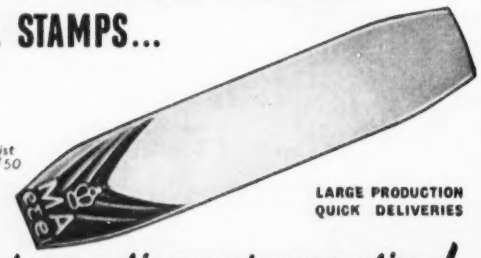

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